

Appendix 3-A (Risk Chapter)

Flexographic Ink Formulations and Structures

Table 3-A.1 lists every flexographic ink chemical that was studied in this CTSA, along with its CAS number and other names by which the chemical is known.

Table 3-A.2 lists all the ink additives that were used during the performance demonstrations.

Following these tables is an alphabetical display of the chemical structures for all substances listed in Table 3-A.1. in the flexographic ink formulations that were supplied for the performance demonstrations.

Table 3-A.1 Flexographic Ink Formulation Chemicals

Chemical substance	CAS number	Synonym
Acrylated epoxy polymer	NK ^a	
Acrylated oligoamine polymer	NK	
Acrylated polyester polymer #1	NK	
Acrylated polyester polymer #2	NK	
Acrylic acid-butyl acrylate-methyl methacrylate-styrene polymer	27306-39-4	2-Propenoic acid, 2-methyl-, methyl ester, polymer with butyl 2-propenoate, ethenylbenzene and 2-propenoic acid
Acrylic acid polymer, acidic #1	NK	
Acrylic acid polymer, acidic #2	NK	
Acrylic acid polymer, insoluble	NK	
Alcohols, C11-15-secondary, ethoxylated	68131-40-8	Ethoxylated C11-15-secondary alcohols
Amides, tallow, hydrogenated	61790-31-6	Hydrogenated tallow amides
Ammonia	7664-41-7	
Ammonium hydroxide	1336-21-6	
Barium	7440-39-3	
2-Benzyl-2-(dimethylamino)-4'-morpholinobutyrophenone	119313-12-1	1-Butanone, 2-(dimethylamino)-1-[4-(4-morpholinyl)phenyl]-2-(phenylmethyl)-
Butyl acetate	123-86-4	Acetic acid butyl ester
Butyl acrylate-methacrylic acid-methyl methacrylate polymer	25035-69-2	2-Propenoic acid, 2-methyl-, polymer with butyl 2-propenoate and methyl 2-methyl-2-propenoate
Butyl carbitol	112-34-5	2-(2-Butoxyethoxy)ethanol
C.I. Basic Violet 1, molybdatephosphate	67989-22-4	Benzenamine, 4-[(4-aminophenyl)(4-imino-2,5-cyclohexadien-1-ylidene)methyl], N-Me derivs., molybdatephosphates
C.I. Basic Violet 1, molybdatetungstatephosphate	1325-82-2	Benzenamine, 4-[(4-aminophenyl)(4-imino-2,5-cyclohexadien-1-ylidene)methyl]-, N-Me derivs., molbdatetungstatephosphates
C.I. Pigment Blue 15	147-14-8	Copper(II) phthalocyanine
C.I. Pigment Blue 61	1324-76-1	Benzenesulfonic acid, ((4-((4-(phenylamino)phenyl)(4-(phenylamino)-2,5-cyclohexadien-1-ylidene)methyl)phenyl)amino)-
C.I. Pigment Green 7	1328-53-6	Copper phthalocyanine green derivative
C.I. Pigment Red 23	6471-49-4	2-Naphthalenecarboxamide, 3-hydroxy-4-((2-methoxy-5-nitrophenyl)azo)-N-(3-nitrophenyl)
C.I. Pigment Red 48, barium salt (1:1)	7585-41-3	2-Naphthalenecarboxylic acid, 4-((5-chloro-4-methyl-2-sulfophenyl)azo)3-hydroxy-, barium salt (1:1)
C.I. Pigment Red 48, calcium salt (1:1)	7023-61-2	2-Naphthalenecarboxylic acid, 4-((5-chloro-4-methyl-2-sulfophenyl)azo)3-hydroxy-, calcium salt (1:1)

Table 3-A.1 Flexographic Ink Formulation Chemicals (continued)

Chemical substance	CAS number	Synonym
C.I. Pigment Red 52, calcium salt (1:1)	17852-99-2	2-Naphthalenecarboxylic acid, 4-((4-chloro-5-methyl-2-sulfophenyl)azo)-3-hydroxy-, calcium salt (1:1)
C.I. Pigment Red 269	67990-05-0	2-Naphthalenecarboxamide, N-(5-chloro-2-methoxyphenyl)-3-hydroxy-4-[[2-methoxy-5-[(phenylamino)carbonyl]phenyl]azo]-
C.I. Pigment Violet 23	6358-30-1	Diindolo(3,2-b:3',2'-m)triphenodioxazine, 8,18-dichloro-5,15-diethyl-5,15-dihydro-
C.I. Pigment Violet 27	12237-62-6	Ferrate(4-), hexakis(Cyano-C)-, methylated 4-[(4-aminophenyl)(4-imino-2,5-cyclohexadien-1-ylidene)methyl]benzenamine copper (2+) salts
C.I. Pigment White 6	13463-67-7	Titanium oxide (TiO ₂)
C.I. Pigment White 7	1314-98-3	Zinc sulfide
C.I. Pigment Yellow 14	5468-75-7	Butanamide, 2,2'-((3,3'-dichloro(1,1'-biphenyl)-4,4'-diyl)bis(azo))bis(N-(2-methylphenyl)-3-oxo-
C.I. Pigment Yellow 74	6358-31-2	Butanamide, 2-((2-methoxy-4-nitrophenyl)azo)-N-(2-methoxyphenyl)-3-oxo-
Citric acid	77-92-9	2-Hydroxy-1,2,3-tricarboxylic acid
D&C Red No. 7	5281-04-9	3-Hydroxy-4-((4-methyl-2-sulfophenyl)azo)-2-naphthalenecarboxylic acid, calcium salt
Dicyclohexyl phthalate	84-61-7	1,2-Benzenedicarboxylic acid, dicyclohexyl ester
Diocetyl sulfosuccinate, sodium salt	577-11-7	Succinic acid, sulfo-, 1,4-bis(2-ethylhexyl)ester, Na salt
Diphenyl(2,4,6-trimethylbenzoyl)phosphine oxide	75980-60-8	
Dipropylene glycol diacrylate	57472-68-1	2-Propenoic acid, oxybis(methyl-2,1-ethanediyl) ester
Dipropylene glycol methyl ether	34590-94-8	Propanol, (2-methoxymethylethoxy)-
Distillates (petroleum), hydrotreated light	64742-47-8	Kerosene (petroleum), hydrotreated
Distillates (petroleum), solvent-refined light paraffinic	64741-89-5	Petroleum distillates
Erucamide	112-84-5	cis-13-Docosenoamide
Ethanol	64-17-5	Ethyl alcohol
Ethanolamine	141-43-5	2-Aminoethanol
Ethoxylated tetramethyldecyldiol	9014-85-1	Poly(oxy-1,2-ethanediyl), .alpha.,.alpha.'-[1,4-dimethyl-1,4-bis(2-methylpropyl)-2-butyne-1,4-diyl]bis[.omega.-hydroxy-
Ethyl acetate	141-78-6	Acetic acid, ethyl ester
Ethyl carbitol	111-90-0	Ethanol, 2-(2-ethoxyethoxy)-
Ethyl 4-dimethylaminobenzoate	10287-53-3	Benzoic acid, 4-(dimethylamino)-, ethyl ester
2-Ethylhexyl diphenyl phosphate	1241-94-7	Phosphoric acid, 2-ethylhexyl diphenyl ester
Fatty acid, dimer-based polyamide	NK	

Table 3-A.1 Flexographic Ink Formulation Chemicals (continued)

Chemical substance	CAS number	Synonym
Fatty acids, C18-unsatd., dimers, polymers with ethylenediamine, hexamethylenediamine, and propionic acid	67989-30-4	
Glycerol propoxylate triacrylate	52408-84-1	Propoxylated glycerol triacrylate
n-Heptane	142-82-5	
1,6-Hexanediol diacrylate	13048-33-4	2-Propenoic acid, 1,6-hexanediyl ester
1-Hydroxycyclohexyl phenyl ketone	947-19-3	(1-Hydroxycyclohexyl)phenylmethanone
Hydroxylamine derivative	NK	
2-Hydroxy-2-methylpropiophenone	7473-98-5	2-Hydroxy-2-methyl-1-phenyl-1-propanone
Hydroxypropyl acrylate	25584-83-2	2-Propenoic acid, monoester with 1,2-propanediol
Isobutanol	78-83-1	2-Methyl-1-propanol
Isopropanol	67-63-0	2-Propanol
Isopropoxyethoxytitanium bis(acetylacetonate)	68586-02-7	Titanium, ethoxybis(2,4-pentanedionato-O,O')(2-propanolato)-
2-Isopropylthioxanthone	5495-84-1	9H-Thioxanthen-9-one, 2-(1-methylethyl)-
4-Isopropylthioxanthone	83846-86-0	9H-Thioxanthen-9-one, 4-(1-methylethyl)-
Kaolin	1332-58-7	Aluminum silicate hydroxide
Methylenedisalicylic acid	27496-82-8	Methylenebis[2-hydroxybenzoic acid]
2-Methyl-4'-(methylthio)-2-morpholinopropiophenone	71868-10-5	Morpholinopropiophenone, 2-methyl-4'-(methylthio)-
Mineral oil	8012-95-1	Paraffin oils
Nitrocellulose	9004-70-0	Cellulose nitrate
Paraffin wax	8002-74-2	Paraffin waxes and hydrocarbon waxes
Phosphine oxide, bis(2,6-dimethoxybenzoyl) (2,4,4-trimethylpentyl)	145052-34-2	
Polyethylene	9002-88-4	Ethene polymer
Polyethylene glycol	25322-68-3	Poly(oxy-1,2-ethanediyl), .alpha.-hydro-.omega.-hydroxy-
Polyol derivative A (generic ID) ^b		
Polytetrafluoroethylene	9002-84-0	
Propanol	71-23-8	1-Propanol
Propyl acetate	109-60-4	Acetic acid, propyl ester
Propylene glycol methyl ether	107-98-2	1-Methoxy-2-propanol
Propylene glycol propyl ether	1569-01-3	1-Propoxy-2-propanol
Resin acids, hydrogenated, methyl esters	8050-15-5	
Resin, acrylic	NK	
Resin, miscellaneous	NK	Resin, miscellaneous

Table 3-A.1 Flexographic Ink Formulation Chemicals (continued)

Chemical substance	CAS number	Synonym
Rosin, fumarated, polymer with diethylene glycol and pentaerythritol	68152-50-1	Fumarated rosin, diethylene glycol pentaerythritol polymer
Rosin, fumarated, ethylene polymer derivitized	NK	
Rosin, polymerized	65997-05-9	
Silanamine, 1,1,1-trimethyl-N-(trimethylsilyl)-, hydrolysis products with silica	68909-20-6	
Silica	7631-86-9	Silicon dioxide
Silicone oil	63148-62-9	Siloxanes and silicones, di-Me
Siloxanes and silicones, di-Me, 3-hydroxypropyl Me, ethers with polyethylene glycol acetate	70914-12-4	
Solvent naphtha (petroleum), light aliphatic	64742-89-8	VM&P naphtha, Skellysolve
Styrene	100-42-5	Ethenylbenzene
Styrene acrylic acid polymer #1	NK	
Styrene acrylic acid polymer #2	NK	
Styrene acrylic acid resin	NK	
Tetramethyldecyndiol	126-86-3	2,4,7,9-Tetramethyl-5-decyne-4,7-diol
Thioxanthone derivative	NK	
Trimethylolpropane ethoxylate triacrylate	28961-43-5	Poly(oxy-1,2-ethanediyl), .alpha.-hydro-.omega.-[(1-oxo-2-propenyl)oxy]-, ether with 2-ethyl-2-(hydroxymethyl)-1,3-propanediol
Trimethylolpropane propoxylate triacrylate	53879-54-2	Poly(oxy(methyl-1,2-ethanediyl)), .alpha.-hydro-.omega.-((1-oxo-2-propenyl)oxy)-, ether with 2-ethyl-2-(hydroxymethyl)-1,3-propanediol (3:1)
Trimethylolpropane triacrylate	15625-89-5	2-Propenoic acid, 2-ethyl-2-(((1-oxo-2-propenyl)oxy)methyl-1,3-propanediyl ester
Urea	57-13-6	

^a Not known.^b Actual chemical name is confidential business information.

Table 3-A.2 Ink Additives Used in the Performance Demonstrations

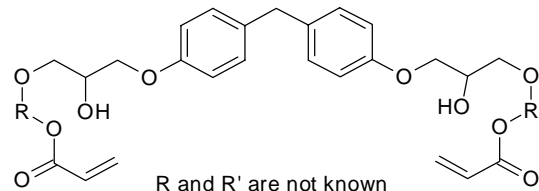
Ink formulation	Site	Color	Chemical
Solvent-based Ink #S1	9B	blue	propanol
		green	none
		white	propanol
		cyan	n-propyl acetate
		magenta	propylene glycol ether
			trade secret
Solvent-based Ink #S2	5	all colors	none
	7	white	propanol
		all other colors	none
	10	blue, green	none
		white	propanol
		cyan	propylene glycol monomethyl ether
			2-methoxy-1-propanol
		magenta	propylene glycol monomethyl ether
			2-methoxy-1-propanol
Water-based Ink #W1	4	white	ethoxylated tetramethyl-decyndiol
		all other colors	none
Water-based Ink #W2	1	blue	isobutanol
			ethyl carbitol
			propanol
		green	none
		white	propanol
		cyan	isobutanol
			ethyl carbitol
			ammonia
		magenta	isobutanol
			ethyl carbitol

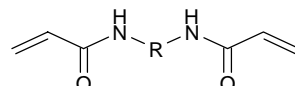
Table 3-A.2 Ink Additives Used in the Performance Demonstrations (continued)

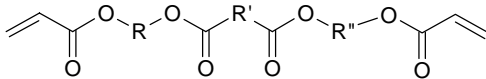
Ink formulation	Site	Color	Chemical
Water-based Ink #W3	2	blue	propanol
			ammonia
			asopropanol
			polyfunctional aziridine
			other compounds
		green	propanol
			ammonia
			isopropanol
		white	propanol
			ammonia
			isopropanol
		cyan	ammonia
		magenta	ammonia
			propanol
			isopropanol
	3	blue	propanol
			ammonia
		green	ammonia
		white	extender
			propanol
			ammonia
		cyan	ammonia
Water-based Ink #W4	9A	blue	propanol
			ammonia
		green	ammonia
		white	none
		cyan	solids
			ethyl carbitol
			petroleum distillate
			propanol
			ammonia
		magenta	ammonia
UV-cured Ink #U1	11	green	1,6-hexanediol diacrylate
		all other colors	none
UV-cured Ink #U2	6	all colors	none
UV-cured Ink #U3	8	all colors	none

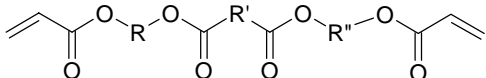
Chemical Properties Data

NK = not known
 NAVG = number average molecular weight
 NA = not available
 E = estimated

Acrylated epoxy polymer, CAS # NK	
Chemical Properties and Information	
<p>Chemical Name: NK</p> <p>Synonyms: NK</p> <p>Molecular Formula: C, H, O</p> <p>Molecular Weight: NAVG 1500</p> <p>Melting Point: NA °C (E)</p> <p>Boiling Point: NA °C (E)</p> <p>Vapor Pressure: <0.000001 mm Hg (E)</p> <p>Flash Point: NA °C (M)</p> <p>Water Solubility: <0.000001 g/L (E)</p> <p>Density: 1 g/cm³ (E)</p> <p>Log₁₀K_{ow}: NA (E)</p> <p>Log₁₀K_{oc}: NA (E)</p> <p>Log₁₀BCF: NA (E)</p> <p>Function in ink: Curable resin</p>	<p>Structure: An average of 2 acrylates/molecule</p>  <p>R and R' are not known</p> <p>Henry's Law: NA atm-m³/mol (E)</p>

Acrylated oligoamine polymer, CAS # NK	
Chemical Properties and Information	
<p>Chemical Name: NK</p> <p>Synonyms: NK</p> <p>Molecular Formula: C, H, N, O</p> <p>Molecular Weight: NAVG 2000</p> <p>Melting Point: NA °C (E)</p> <p>Boiling Point: NA °C (E)</p> <p>Vapor Pressure: <0.000001 mm Hg (E)</p> <p>Flash Point: NA °C (M)</p> <p>Water Solubility: <0.000001 g/L (E)</p> <p>Density: 1 g/cm³ (E)</p> <p>Log₁₀K_{ow}: NA (E)</p> <p>Log₁₀K_{oc}: NA (E)</p> <p>Log₁₀BCF: NA (E)</p> <p>Function in ink: Curable resin</p>	<p>Structure: An average of 2 acrylates/molecule</p>  <p>R = polymer</p> <p>Henry's Law: NA atm-m³/mol (E)</p>

Acrylated polyester polymer #1, CAS # NK	
Chemical Properties and Information	
<p>Chemical Name: NK</p> <p>Synonyms: Ebecryl 870</p> <p>Molecular Formula: C, H, O</p> <p>Molecular Weight: NAVG 4350</p> <p>Melting Point: NA °C (E)</p> <p>Boiling Point: NA °C (E)</p> <p>Vapor Pressure: <0.000001 mm Hg (E)</p> <p>Flash Point: NA °C (M)</p> <p>Water Solubility: <0.000001 g/L (E)</p> <p>Density: 1 g/cm³ (E)</p> <p>Log₁₀K_{ow}: NA (E)</p> <p>Log₁₀K_{oc}: NA (E)</p> <p>Log₁₀BCF: NA (E)</p> <p>Function in ink: Curable resin</p>	<p>Structure: An average of 5-6 acrylates/ molecule</p>  <p>R, R', and R'' are not known</p> <p>Henry's Law: NA atm-m³/mol (E)</p>

Acrylated polyester polymer #2, CAS # NK	
Chemical Properties and Information	
<p>Chemical Name: NK</p> <p>Synonyms: NK</p> <p>Molecular Formula: C, H, O</p> <p>Molecular Weight: NAVG 1500</p> <p>Melting Point: NA °C (E)</p> <p>Boiling Point: NA °C (E)</p> <p>Vapor Pressure: <0.000001 mm Hg (E)</p> <p>Flash Point: NA °C (M)</p> <p>Water Solubility: <0.000001 g/L (E)</p> <p>Density: 1 g/cm³ (E)</p> <p>Log₁₀K_{ow}: NA (E)</p> <p>Log₁₀K_{oc}: NA (E)</p> <p>Log₁₀BCF: NA (E)</p> <p>Function in ink: Curable resin</p>	<p>Structure: An average of 4 acrylates/ molecule</p>  <p>R, R', and R'' are not known</p> <p>Henry's Law: NA atm-m³/mol (E)</p>

Acrylic acid-butyl acrylate-methyl methacrylate-styrene polymer,
CAS # 27306-39-4

Chemical Properties and Information

Chemical Name: 2-Propenoic acid, 2-methyl-, methyl ester, polymer with butyl 2-propenoate, ethenylbenzene and 2-propenoic acid

Synonyms: NK

Molecular Formula: $(C_8H_8 \cdot C_7H_{12}O_2 \cdot C_5H_8O_2 \cdot C_3H_4O_2)_x$

Molecular Weight: >3000 (E)

Melting Point: >100 °C (E)

Boiling Point: NA °C (E)

Vapor Pressure: <0.000001 mm Hg (E)

Flash Point: NA °C (M)

Water Solubility: <0.000001 g/L (E)

Density: 1 g/cm³ (E)

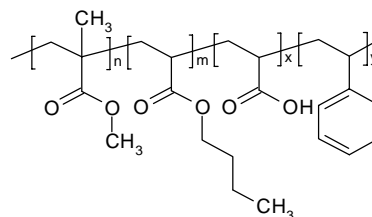
Log₁₀K_{ow}: NA (E)

Log₁₀K_{oc}: NA (E)

Log₁₀BCF: NA (E)

Function in ink: Resin

Structure:



Henry's Law: NA atm-m³/mol (E)

Acrylic acid polymer, acidic #1, CAS # NK

Chemical Properties and Information

Chemical Name: NK

Synonyms: NK

Molecular Formula: $(C_3H_4O_2 \cdot C, H, O)_x$

Molecular Weight: NAVG 5000 (E)

Melting Point: NA °C (E)

Boiling Point: NA °C (E)

Vapor Pressure: <0.000001 mm Hg (E)

Flash Point: NA °C (M)

Water Solubility: <0.000001 g/L (E)

Density: 1 g/cm³ (E)

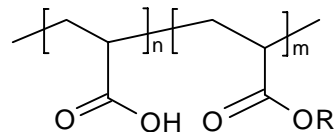
Log₁₀K_{ow}: NA (E)

Log₁₀K_{oc}: NA (E)

Log₁₀BCF: NA (E)

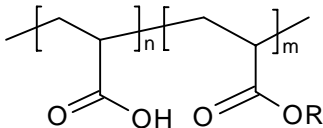
Function in ink: Resin

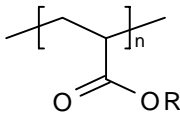
Structure:

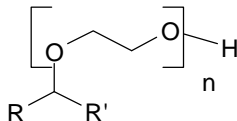


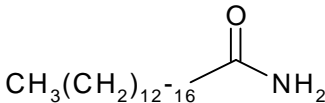
R not equal to H

Henry's Law: NA atm-m³/mol (E)

Acrylic acid polymer, acidic #2, CAS # NK	
Chemical Properties and Information	
Chemical Name: NK Synonyms: NK Molecular Formula: $(C_3H_4O_2 \cdot C, H, O)_x$ Molecular Weight: NAVG 5000 (E) Melting Point: NA °C (E) Boiling Point: NA °C (E) Vapor Pressure: <0.000001 mm Hg (E) Flash Point: NA °C (M) Water Solubility: <0.000001 g/L (E) Density: 1 g/cm ³ (E) Log ₁₀ K _{ow} : NA (E) Log ₁₀ K _{oc} : NA (E) Log ₁₀ BCF: NA (E) Function in ink: Resin	Structure:  R not equal to H Henry's Law: NA atm-m ³ /mol (E)

Acrylic acid polymer, insoluble, CAS # NK	
Chemical Properties and Information	
Chemical Name: NK Synonyms: NK Molecular Formula: C, H, O Molecular Weight: NAVG >10,000 (E) Melting Point: NA °C (E) Boiling Point: NA °C (E) Vapor Pressure: <0.000001 mm Hg (E) Flash Point: NA °C (M) Water Solubility: <0.000001 g/L (E) Density: 1 g/cm ³ (E) Log ₁₀ K _{ow} : NA (E) Log ₁₀ K _{oc} : NA (E) Log ₁₀ BCF: NA (E) Function in ink: Resin	Structure:  R not equal to H Henry's Law: NA atm-m ³ /mol (E)

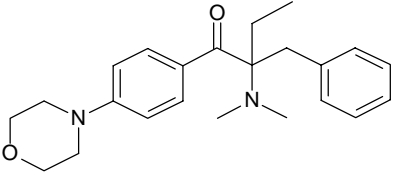
Alcohols, C11-15-secondary, ethoxylated, CAS # 68131-40-8	
Chemical Properties and Information	
<p>Chemical Name: Alcohols, C11-15-secondary, ethoxylated</p> <p>Synonyms: Ethoxylated C11-15-secondary alcs.</p> <p>Molecular Formula: C, H, O</p> <p>Molecular Weight: 347 (n = 3)</p> <p>Melting Point: °C (E)</p> <p>Boiling Point: >350 °C (E)</p> <p>Vapor Pressure: <0.000001 mm Hg (E)</p> <p>Flash Point: NA °C (M)</p> <p>Water Solubility: Dispersible g/L (E)</p> <p>Density: 1 g/cm³ (E)</p> <p>Log₁₀K_{ow}: NA (E)</p> <p>Log₁₀K_{oc}: NA (E)</p> <p>Log₁₀BCF: NA (E)</p> <p>Function in ink: Dispersant</p>	<p>Structure:</p>  <p>R+R' = C10-14 alkyl</p> <p>Henry's Law: NA atm-m³/mol (E)</p>

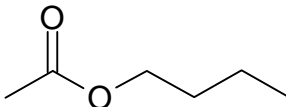
Amides, tallow, hydrogenated, CAS # 61790-31-6	
Chemical Properties and Information	
<p>Chemical Name: Amides, tallow, hydrogenated</p> <p>Synonyms: Armid HT</p> <p>Molecular Formula: C₁₈H₃₇NO (TYPCL)</p> <p>Molecular Weight: 283.50 (TYPCL)</p> <p>Melting Point: 152 °C (E)</p> <p>Boiling Point: >400 °C (E)</p> <p>Vapor Pressure: <0.000001 mm Hg (E)</p> <p>Flash Point: NA °C (M)</p> <p>Water Solubility: 0.00003 g/L (E)</p> <p>Density: 1 g/cm³ (E)</p> <p>Log₁₀K_{ow}: 6.70 (E)</p> <p>Log₁₀K_{oc}: 5.01(E)</p> <p>Log₁₀BCF: 4.86 (E)</p> <p>Function in ink: Vehicle</p>	<p>Structure:</p>  <p>Henry's Law: 1E-6 atm-m³/mol (E)</p>

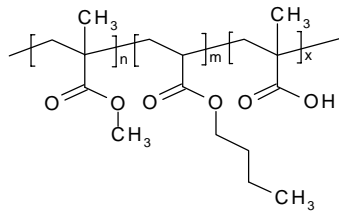
Ammonia, CAS # 7664-41-7	
Chemical Properties and Information	
Chemical Name: Ammonia Synonyms: None Molecular Formula: NH_3 Molecular Weight: 17.03 Melting Point: -77.7°C (M) Boiling Point: -33.35°C (M) Vapor Pressure: >2160 mm Hg (E) Flash Point: NA $^\circ\text{C}$ (M) Water Solubility: 310 (at 25°C) g/L (M) Density: vapor: 0.5967 (air = 1) (M) liquid at -33°C and 1 atm: 0.682 g/cm^3 Log ₁₀ K _{ow} : NA (E) Log ₁₀ K _{oc} : NA (E) Log ₁₀ BCF: NA (E) Function in ink: Buffer	Structure: NH_3 Henry's Law: NA atm-m ³ /mol (E) POTW Overall Removal Rate (%):

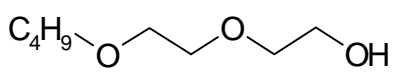
Ammonium hydroxide, CAS # 1336-21-6	
Chemical Properties and Information	
Chemical Name: Ammonium hydroxide Synonyms: Ammonia aqueous, Aqua ammonia Molecular Formula: $\text{H}_4\text{N.HO}$ Molecular Weight: 35.05 Melting Point: NA $^\circ\text{C}$ (M) Boiling Point: NA $^\circ\text{C}$ (M) Vapor Pressure: 2160 mm Hg (M) Flash Point: None $^\circ\text{C}$ (M) Water Solubility: >1000 (miscible) g/L (E) Density: 0.900 g/cm^3 (M) Log ₁₀ K _{ow} : NA (E) Log ₁₀ K _{oc} : NA (E) Log ₁₀ BCF: NA (E) Function in ink: Buffer	Structure: NH_4OH Approximately 28-29% NH_3 in water. Henry's Law: NA atm-m ³ /mol (E)

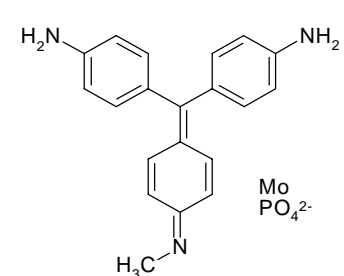
Barium, CAS # 7440-39-3	
Chemical Properties and Information	
Chemical Name: Barium Synonyms: None Molecular Formula: Ba Molecular Weight: 137.34 Melting Point: about 710 °C (E) Boiling Point: about 1600 °C (E) Vapor Pressure: <0.000001 mm Hg (E) Flash Point: NA °C (M) Water Solubility: Reacts Density: 3.60 g/cm ³ (M) Log ₁₀ K _{ow} : NA (E) Log ₁₀ K _{oc} : NA (E) Log ₁₀ BCF: NA (E) Function in ink: Reactant	Structure: <div style="text-align: center; margin: 20px 0;">Ba</div> Henry's Law: NA atm-m ³ /mol (E)

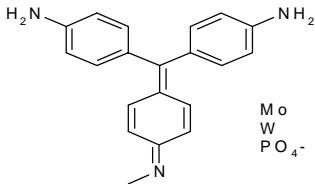
2-Benzyl-2-(dimethylamino)-4'-morpholinobutyrophenone, CAS # 119313-12-1	
Chemical Properties and Information	
Chemical Name: 1-Butanone, 2-(dimethylamino)-1-[4-(4-morpholinyl)phenyl]-2-(phenylmethyl)- Synonyms: 2-Benzyl-2-(dimethylamino)-1-(4-morpholinophenyl)-1-butanone Molecular Formula: C ₂₃ H ₃₀ N ₂ O ₂ Molecular Weight: 366.51 Melting Point: 116-119 °C (M) Boiling Point: 457 °C (E) Vapor Pressure: <0.000001 mm Hg (E) Flash Point: NA °C (M) Water Solubility: 0.0061 g/L (E) Density: 1 g/cm ³ (E) Log ₁₀ K _{ow} : 4.50 (E) Log ₁₀ K _{oc} : 3.66 (E) Log ₁₀ BCF: 3.19 (E) Function in ink: NA, initiator (E)	Structure: <div style="text-align: center; margin: 20px 0;">  </div> Henry's Law: <1E-8 atm-m ³ /mol (E)

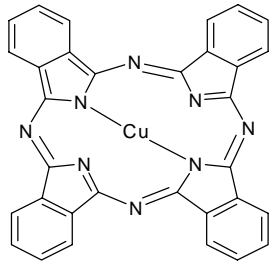
Butyl acetate, CAS # 123-86-4	
Chemical Properties and Information	
<p>Chemical Name: Acetic acid, butyl ester</p> <p>Synonyms: Butyl ethanoate, 1-Butyl acetate</p> <p>Molecular Formula: $C_6H_{12}O_2$</p> <p>Molecular Weight: 116.16</p> <p>Melting Point: -78 °C (M)</p> <p>Boiling Point: 124-126 °C (M)</p> <p>Vapor Pressure: 11.5 mm Hg (M)</p> <p>Flash Point: 22 °C (M)</p> <p>Water Solubility: 6.29 g/L (M)</p> <p>Density: 0.882 g/cm³ (M)</p> <p>Log₁₀K_{ow}: 1.78 (M), 1.85 (E)</p> <p>Log₁₀K_{oc}: 1.319 (E)</p> <p>Log₁₀BCF: 1.123 (E)</p> <p>Function in ink: Solvent</p>	<p>Structure:</p>  <p>Henry's Law: 0.000315 atm-m³/mol (E)</p>

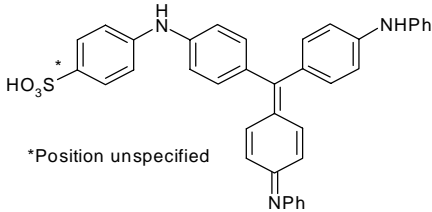
Butyl acrylate-methacrylic acid-methyl methacrylate polymer, CAS # 25035-69-2	
Chemical Properties and Information	
<p>Chemical Name: 2-Propenoic acid, 2-methyl-, polymer with butyl 2-propenoate and methyl 2-methyl-2-propenoate</p> <p>Synonyms: Methacrylic acid, polymer with butyl acrylate and methyl methacrylate</p> <p>Molecular Formula: $(C_7H_{12}O_2 \cdot C_5H_8O_2 \cdot C_4H_6O_2)_x$</p> <p>Molecular Weight: >3000 (E)</p> <p>Melting Point: NA °C (E)</p> <p>Boiling Point: NA °C (E)</p> <p>Vapor Pressure: <0.000001 mm Hg (E)</p> <p>Flash Point: NA °C (M)</p> <p>Water Solubility: <0.000001 g/L (E)</p> <p>Density: 1 g/cm³ (E)</p> <p>Log₁₀K_{ow}: NA (E)</p> <p>Log₁₀K_{oc}: NA (E)</p> <p>Log₁₀BCF: NA (E)</p> <p>Function in ink: Resin</p>	<p>Structure:</p>  <p>Henry's Law: NA atm-m³/mol (E)</p>

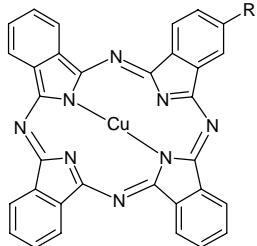
Butyl carbitol, CAS # 112-34-5	
Chemical Properties and Information	
<p>Chemical Name: 2-(2-Butoxyethoxy)ethanol</p> <p>Synonyms: Butoxydiethylene glycol, Diethylene glycol n-butyl ether</p> <p>Molecular Formula: $C_8H_{18}O_3$</p> <p>Molecular Weight: 162.25</p> <p>Melting Point: $-68.1\text{ }^{\circ}\text{C}$ (M)</p> <p>Boiling Point: $230.4\text{ }^{\circ}\text{C}$ (M)</p> <p>Vapor Pressure: 0.0219 mm Hg (M)</p> <p>Flash Point: $110\text{ }^{\circ}\text{C}$ open, $78\text{ }^{\circ}\text{C}$ closed cup (M)</p> <p>Water Solubility: 1000 g/L (miscible) (E)</p> <p>Density: 0.967 g/cm^3 (M)</p> <p>$\text{Log}_{10}K_{ow}$: 0.56 (M), 0.29 (E)</p> <p>$\text{Log}_{10}K_{oc}$: 1.0 (E)</p> <p>$\text{Log}_{10}\text{BCF}$: 0.196 (E)</p> <p>Function in ink: Solvent</p>	<p>Structure:</p>  <p>Henry's Law: $<1\text{E-}8\text{ atm}\cdot\text{m}^3/\text{mol}$ (E)</p>

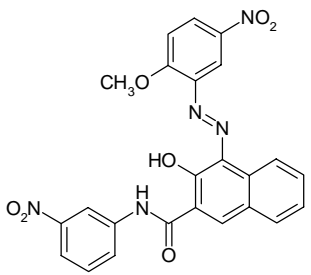
C.I. Basic Violet 1, molybdatephosphate, CAS # 67989-22-4	
Chemical Properties and Information	
<p>Chemical Name: Benzenamine, 4-[(4-aminophenyl)(4-imino-2,5-cyclohexadien-1-ylidene)methyl], N-Me-derivs., molybdatephosphates</p> <p>Synonyms: None</p> <p>Molecular Formula: $C_{20}H_{19}N_3\cdot\text{Mo}\cdot\text{H}_3\text{O}_4\text{P}$</p> <p>Molecular Weight: 350 (E)</p> <p>Melting Point: >250 (dec) $^{\circ}\text{C}$ (E)</p> <p>Boiling Point: NA $^{\circ}\text{C}$ (E)</p> <p>Vapor Pressure: <0.000001 mm Hg (E)</p> <p>Flash Point: NA $^{\circ}\text{C}$ (M)</p> <p>Water Solubility: <0.0001 g/L (E)</p> <p>Density: 1.5 g/cm^3 (E)</p> <p>$\text{Log}_{10}K_{ow}$: NA (E)</p> <p>$\text{Log}_{10}K_{oc}$: NA (E)</p> <p>$\text{Log}_{10}\text{BCF}$: NA (E)</p> <p>Function in ink: Pigment</p>	<p>Structure:</p>  <p>Henry's Law: NA $\text{atm}\cdot\text{m}^3/\text{mol}$ (E)</p>

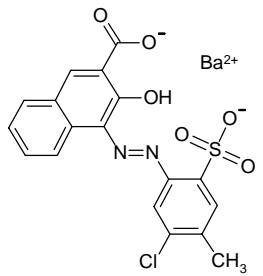
C.I. Basic Violet 1, molybdatetungstatephosphate, CAS # 1325-82-2	
Chemical Properties and Information	
Chemical Name: Benzenamine, 4-[(4-aminophenyl)(4-imino-2,5-cyclohexadien-1-ylidene)methyl]-, N-Me derivs, molybdatetungstatephosphate	
Synonyms: C.I. Pigment Violet 3	Structure:
Molecular Formula: $C_{19}H_{19}N_3 \cdot Mo.W.H_3PO_4$	
Molecular Weight: >350 (E)	
Melting Point: >250 (dec) °C (E)	Henry's Law: NA atm-m ³ /mol (E)
Boiling Point: NA °C (E)	
Vapor Pressure: <0.000001 mm Hg (E)	
Flash Point: NA °C (M)	
Water Solubility: <0.001 g/L (E)	
Density: 1.5 g/cm ³ (E)	
Log ₁₀ K _{ow} : NA (E)	
Log ₁₀ K _{oc} : NA (E)	
Log ₁₀ BCF: NA (E)	
Function in ink: Pigment	

C.I. Pigment Blue 15, CAS # 147-14-8	
Chemical Properties and Information	
Chemical Name: Copper(II)phthalocyanine	
Synonyms: None	Structure:
Molecular Formula: $C_{32}H_{16}CuN_8$	
Molecular Weight: 576.08	
Melting Point: NA °C (E)	Henry's Law: NA atm-m ³ /mol (E)
Boiling Point: >450 °C (E)	
Vapor Pressure: <0.000001 mm Hg (E)	
Flash Point: NA °C (M)	
Water Solubility: <0.001 g/L (E)	
Density: 1.5 g/cm ³ (E)	
Log ₁₀ K _{ow} : NA (E)	
Log ₁₀ K _{oc} : NA (E)	
Log ₁₀ BCF: NA (E)	
Function in ink: Pigment	

C.I. Pigment Blue 61, CAS # 1324-76-1	
Chemical Properties and Information	
Chemical Name: Benzenesulfonic acid, ((4-((4-(phenylamino)phenyl)(4-(phenylamino)-2,5-cyclohexadien-1-ylidene)methyl)phenyl)amino)-	
Synonyms: Reflex Blue R Molecular Formula: $C_{37}H_{29}N_3O_3S$ Molecular Weight: 595.70 Melting Point: 350 °C (E) Boiling Point: >450 °C (E) Vapor Pressure: 0.000001 mm Hg (E) Flash Point: NA °C (M) Water Solubility: <0.000001 g/L (E) Density: 1 g/cm ³ (E) Log ₁₀ K _{ow} : 6.514 (E) Log ₁₀ K _{oc} : 9.227 (E) Log ₁₀ BCF: 4.721 (E) Function in ink: Pigment	Structure:  Henry's Law: <1E-8 atm-m ³ /mol (E)

C.I. Pigment Green 7, CAS # 1328-53-6	
Chemical Properties and Information	
Chemical Name: C.I. Pigment Green 7	
Synonyms: Copper phthalocyanine Green PG-7	Structure:  Henry's Law: NA atm-m ³ /mol (E)
Molecular Formula: Unspecified Molecular Weight: >550 (E) Melting Point: NA °C (E) Boiling Point: >450 °C (E) Vapor Pressure: <0.000001 mm Hg (E) Flash Point: NA °C (M) Water Solubility: <0.001 g/L (E) Density: 1.5 g/cm ³ (E) Log ₁₀ K _{ow} : NA (E) Log ₁₀ K _{oc} : NA (E) Log ₁₀ BCF: NA (E) Function in ink: Pigment	

C.I. Pigment Red 23, CAS # 6471-49-4	
Chemical Properties and Information	
Chemical Name: 2-Naphthalenecarboxamide, 3-hydroxy-4-((2-methoxy-5-nitrophenyl)azo)-N-(3-nitrophenyl)	
Synonyms: Naphthol Red B	Structure:
Molecular Formula: $C_{24}H_{17}N_5O_7$	
Molecular Weight: 487.43	
Melting Point: 322 °C (E)	Henry's Law: <1E-6 atm·m ³ /mol (E)
Boiling Point: >500 °C (E)	
Vapor Pressure: <0.000001 mm Hg (E)	
Flash Point: NA °C (M)	
Water Solubility: <0.000001 g/L (E)	
Density: 1 g/cm ³ (E)	
Log ₁₀ K _{ow} : 8.30 (E)	
Log ₁₀ K _{oc} : 4.9 (E)	
Log ₁₀ BCF: 6.08 (E)	
Function in ink: Pigment	

C.I. Pigment Red 48, barium salt (1:1), CAS # 7585-41-3	
Chemical Properties and Information	
Chemical Name: 2-Naphthalenecarboxylic acid, 4-[(5-chloro-4-methyl-2-sulfophenyl)azo]-3-hydroxy-, barium salt (1:1)	
Synonyms: None	Structure:
Molecular Formula: $C_{18}H_{13}ClN_2O_6S.Ba$	
Molecular Weight: 558.14	
Melting Point: >250 (dec) °C (E)	Henry's Law: NA atm·m ³ /mol (E)
Boiling Point: NA °C (E)	
Vapor Pressure: <0.000001 mm Hg (E)	
Flash Point: NA °C (M)	
Water Solubility: <0.1 g/L (E)	
Density: 1.5 g/cm ³ (E)	
Log ₁₀ K _{ow} : NA (E)	
Log ₁₀ K _{oc} : NA (E)	
Log ₁₀ BCF: NA (E)	
Function in ink: Pigment	

C.I. Pigment Red 48, calcium salt (1:1), CAS # 7023-61-2

Chemical Properties and Information

Chemical Name: 2-Naphthalenecarboxylic acid, 4-[(5-chloro-4-methyl-2-sulphophenyl)azo]-3-hydroxy-, calcium salt (1:1)

Synonyms: None

Molecular Formula: $C_{18}H_{13}ClN_2O_6S.Ca$

Molecular Weight: 460.90

Melting Point: >250 (dec) °C (E)

Boiling Point: NA °C (E)

Vapor Pressure: <0.000001 mm Hg (E)

Flash Point: NA °C (M)

Water Solubility: <0.1 g/L (E)

Density: 1.5 g/cm³ (E)

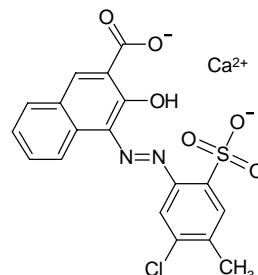
Log₁₀K_{ow}: NA (E)

Log₁₀K_{oc}: NA (E)

Log₁₀BCF: NA (E)

Function in ink: Pigment

Structure:



Henry's Law: NA atm·m³/mol (E)

C.I. Pigment Red 52, calcium salt (1:1), CAS # 17852-99-2

Chemical Properties and Information

Chemical Name: 2-Naphthalenecarboxylic acid, 4-[(4-chloro-5-methyl-2-sulphophenyl)azo]-3-hydroxy-, calcium salt (1:1)

Synonyms: C.I. Pigment Red 52:1

Molecular Formula: $C_{18}H_{13}ClN_2O_6S.Ca$

Molecular Weight: 460.90

Melting Point: >250 (dec) °C (E)

Boiling Point: NA °C (E)

Vapor Pressure: <0.000001 mm Hg (E)

Flash Point: NA °C (M)

Water Solubility: <0.0001 g/L (E)

Density: 1.5 g/cm³ (E)

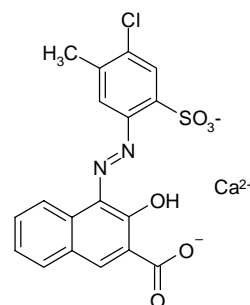
Log₁₀K_{ow}: NA (E)

Log₁₀K_{oc}: NA (E)

Log₁₀BCF: NA (E)

Function in ink: Pigment

Structure:



Henry's Law: NA atm·m³/mol (E)

C.I. Pigment Red 269, CAS # 67990-05-0

Chemical Properties and Information

Chemical Name: 2-Naphthalenecarboxamide, N-(5-chloro-2-methoxyphenyl)-3-hydroxy-4-[[2-methoxy-5-[(phenylamino)carbonyl]phenyl]azo]-

Synonyms: None

Molecular Formula: $C_{32}H_{25}ClN_4O_5$

Molecular Weight: 581.03

Melting Point: $>350^{\circ}\text{C}$ (E)

Boiling Point: NA $^{\circ}\text{C}$ (E)

Vapor Pressure: <0.000001 mm Hg (E)

Flash Point: NA $^{\circ}\text{C}$ (M)

Water Solubility: <0.000001 g/L (E)

Density: 1 g/cm³ (E)

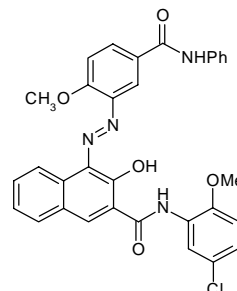
$\text{Log}_{10}K_{ow}$: 8.24 (E)

$\text{Log}_{10}K_{oc}$: 5.964 (E)

$\text{Log}_{10}\text{BCF}$: 6.033 (E)

Function in ink: Pigment

Structure:



Henry's Law: $<1\text{E-}8$ atm-m³/mol (E)

C.I. Pigment Violet 23, CAS # 6358-30-1

Chemical Properties and Information

Chemical Name: Diindolo(3,2-b:3',2'-m)triphenodioxazine, 8,18-dichloro-5,15-diethyl-5,15-dihydro-

Synonyms: None

Molecular Formula: $C_{34}H_{22}Cl_2N_4O_2$

Molecular Weight: 589.46

Melting Point: $>200^{\circ}\text{C}$ (E)

Boiling Point: NA $^{\circ}\text{C}$ (E)

Vapor Pressure: <0.000001 mm Hg (E)

Flash Point: NA $^{\circ}\text{C}$ (M)

Water Solubility: <0.0001 g/L (E)

Density: 1 g/cm³ (E)

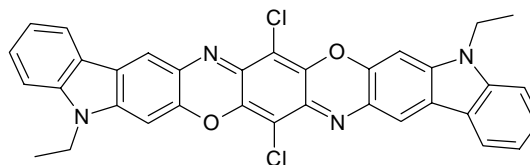
$\text{Log}_{10}K_{ow}$: NA (E)

$\text{Log}_{10}K_{oc}$: NA (E)

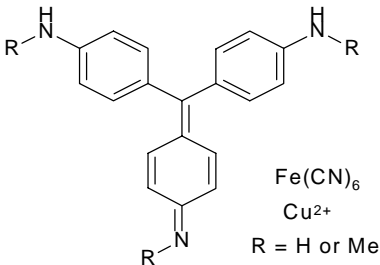
$\text{Log}_{10}\text{BCF}$: NA (E)

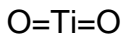
Function in ink: Pigment

Structure:



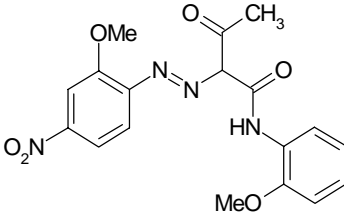
Henry's Law: NA atm-m³/mol (E)

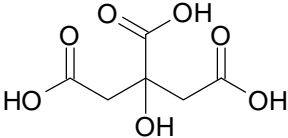
C.I. Pigment Violet 27, CAS # 12237-62-6	
Chemical Properties and Information	
Chemical Name: Ferrate(4-), hexakis(cyano-C)-, methylated 4-[(4-aminophenyl)(4-imino-2,5-cyclohexadien-1-ylidene)methyl]benzenamine copper(2+) salts	
Synonyms: None	Structure:
Molecular Formula: C, H, N . (CN) ₆ Fe. Cu	
Molecular Weight: >350 (E)	
Melting Point: >250 (dec) °C (E)	Henry's Law: NA atm·m ³ /mol (E)
Boiling Point: NA °C (E)	
Vapor Pressure: <0.000001 mm Hg (E)	
Flash Point: NA °C (M)	
Water Solubility: <0.01 g/L	
Density: 1.5 g/cm ³ (E)	
Log ₁₀ K _{ow} : NA (E)	
Log ₁₀ K _{oc} : NA (E)	
Log ₁₀ BCF: NA (E)	
Function in ink: Pigment	

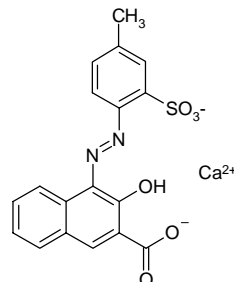
C.I. Pigment White 6, CAS # 13463-67-7	
Chemical Properties and Information	
Chemical Name: Titanium oxide	
Synonyms: Titanium dioxide, Unitane	Structure:
Molecular Formula: O ₂ Ti	
Molecular Weight: 79.88 (based on empirical formula)	
Melting Point: 1855 °C (M)	Henry's Law: NA atm·m ³ /mol (E)
Boiling Point: NA °C (E)	
Vapor Pressure: <0.000001 mm Hg (E)	POTW Overall Removal Rate (%):
Flash Point: NA °C (M)	
Water Solubility: <0.000001 g/L (E)	
Density: 4.23 (rutile); 3.9 (anatase); 4.13 (brookite) g/cm ³	
Log ₁₀ K _{ow} : NA (E)	
Log ₁₀ K _{oc} : NA (E)	
Log ₁₀ BCF: NA (E)	
Function in ink: Pigment	

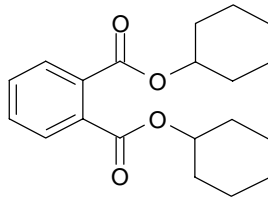
C.I. Pigment White 7, CAS # 1314-98-3	
Chemical Properties and Information	
Chemical Name: Zinc sulfide Synonyms: None Molecular Formula: ZnS Molecular Weight: 97.43 Melting Point: >500 (dec) °C (E) Boiling Point: NA °C (E) Vapor Pressure: <0.000001 mm Hg (E) Flash Point: NA °C (M) Water Solubility: <0.0007 g/L (E) Density: 4.10 g/cm ³ (M) Log ₁₀ K _{ow} : NA (E) Log ₁₀ K _{oc} : NA (E) Log ₁₀ BCF: NA (E) Function in ink: Pigment	Structure: $\text{Zn}=\text{S}$ Henry's Law: NA atm·m ³ /mol (E)

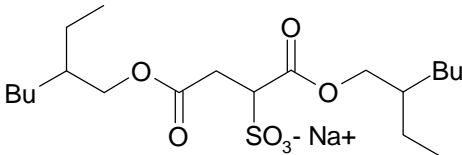
C.I. Pigment Yellow 14, CAS # 5468-75-7	
Chemical Properties and Information	
Chemical Name: Butanamide, 2,2'-((3,3'-dichloro(1,1'-biphenyl)-4,4'-diyl)bis(azo))bis(N-(2-methylphenyl)-3-oxo- Synonyms: None Molecular Formula: C ₃₄ H ₃₀ Cl ₂ N ₆ O ₄ Molecular Weight: 657.52 Melting Point: 350 °C (E) Boiling Point: >450 °C (E) Vapor Pressure: <0.000001 mm Hg (E) Flash Point: NA °C (M) Water Solubility: <0.000001 g/L (E) Density: 1 g/cm ³ (E) Log ₁₀ K _{ow} : 7.02 (E) Log ₁₀ K _{oc} : 5.338 (E) Log ₁₀ BCF: 5.105 (E) Function in ink: Pigment	Structure: Henry's Law: <1E-8 atm·m ³ /mol (E)

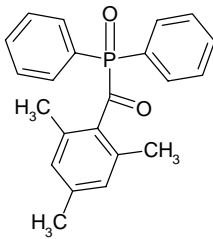
C.I. Pigment Yellow 74, CAS # 6358-31-2	
Chemical Properties and Information	
<p>Chemical Name: Butanamide, 2-[(2-methoxy-4-nitrophenyl)azo]-N-(2-methoxyphenyl)-3-oxo-</p> <p>Synonyms: 2-[(2-Methoxy-4-nitrophenyl)azo]-o-acetoacetanilide</p> <p>Molecular Formula: $C_{18}H_{18}N_4O_6$</p> <p>Molecular Weight: 386.34</p> <p>Melting Point: 241 °C (E)</p> <p>Boiling Point: >500 °C (E)</p> <p>Vapor Pressure: <0.000001 mm Hg (E)</p> <p>Flash Point: NA °C (M)</p> <p>Water Solubility: 0.0038 g/L (E)</p> <p>Density: 1 g/cm³ (E)</p> <p>Log₁₀K_{ow}: 2.99 (E)</p> <p>Log₁₀K_{oc}: 1.95 (E)</p> <p>Log₁₀BCF: 2.04 (E)</p> <p>Function in ink: Pigment</p>	<p>Structure:</p>  <p>Henry's Law: <1E-8 atm·m³/mol (E)</p>

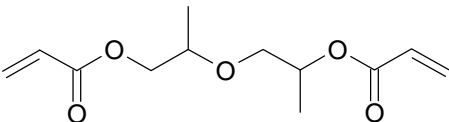
Citric acid, CAS # 77-92-9	
Chemical Properties and Information	
<p>Chemical Name: 2-Hydroxy-1,2,3-propanetricarboxylic acid</p> <p>Synonyms: None</p> <p>Molecular Formula: $C_6H_8O_7$</p> <p>Molecular Weight: 192.12</p> <p>Melting Point: 152-154 °C (M)</p> <p>Boiling Point: 407 °C (E)</p> <p>Vapor Pressure: <0.000001 mm Hg (E)</p> <p>Flash Point: NA °C (M)</p> <p>Water Solubility: > 600 g/L (E)</p> <p>Density: 1.665 g/cm³ (M)</p> <p>Log₁₀K_{ow}: -1.72 (M), -1.67 (E)</p> <p>Log₁₀K_{oc}: 1.0 (E)</p> <p>Log₁₀BCF: -1.537 (E)</p> <p>Function in ink: Buffer</p>	<p>Structure:</p>  <p>Henry's Law: <1E-8 atm·m³/mol (E)</p>

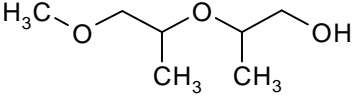
D&C Red No. 7, CAS # 5281-04-9	
Chemical Properties and Information	
Chemical Name: 3-Hydroxy-4-((4-methyl-2-sulfophenyl)azo)-2-naphthylenecarboxylic acid, calcium salt	
Synonyms: Pigment Red, CI 15850:1 (Ca salt)	Structure: 
Molecular Formula: C ₁₈ H ₁₄ N ₂ O ₆ S.Ca	
Molecular Weight: 426.45	
Melting Point: >250 (dec) °C (E)	
Boiling Point: NA °C (E)	
Vapor Pressure: <0.000001 mm Hg (E)	
Flash Point: NA °C (M)	
Water Solubility: <0.001 g/L (E)	
Density: 1.5 g/cm ³ (E)	
Log ₁₀ K _{ow} : NA (E)	
Log ₁₀ K _{oc} : NA (E)	
Log ₁₀ BCF: NA (E)	
Function in ink: Pigment	Henry's Law: NA atm·m ³ /mol (E)

Dicyclohexyl phthalate, CAS # 84-61-7	
Chemical Properties and Information	
Chemical Name: 1,2-Benzenedicarboxylic acid, dicyclohexyl ester	
Synonyms: Phthalic acid, dicyclohexyl ester	Structure: 
Molecular Formula: C ₂₀ H ₂₆ O ₄	
Molecular Weight: 330.43	
Melting Point: 64-66 °C (M)	
Boiling Point: 395 °C (E)	
Vapor Pressure: 0.0007 mm Hg (M)	
Flash Point: NA °C (M)	
Water Solubility: 0.004 g/L (M)	
Density: 0.9 g/cm ³ (E)	
Log ₁₀ K _{ow} : 6.2 (E)	
Log ₁₀ K _{oc} : 4.25 (E)	
Log ₁₀ BCF: 4.48 (E)	
Function in ink: Plasticizer	
Henry's Law: 6.43e-6 atm·m ³ /mol (E)	

Diethyl sulfosuccinate, sodium salt, CAS # 577-11-7	
Chemical Properties and Information	
<p>Chemical Name: Sulfosuccinic acid 1,4-bis(2-ethylhexyl) ester, sodium salt</p> <p>Synonyms: Sulfobutanedioic acid, 1,4-bis(2-ethylhexyl) ester, sodium salt, Docusate Na</p> <p>Molecular Formula: $C_{20}H_{38}O_7S.Na$</p> <p>Molecular Weight: 444.55</p> <p>Melting Point: 173-179 °C (M)</p> <p>Boiling Point: >500 °C (E)</p> <p>Vapor Pressure: <0.000001 mm Hg (E)</p> <p>Flash Point: NA °C (M)</p> <p>Water Solubility: 15 g/L (M)</p> <p>Density: 1.5 g/cm³ (E)</p> <p>Log₁₀K_{ow}: 3.949 (E)</p> <p>Log₁₀K_{oc}: 3.018 (E)</p> <p>Log₁₀BCF: 2.771 (E)</p> <p>Function in ink: Surfactant</p>	<p>Structure:</p>  <p>Henry's Law: NA atm-m³/mol (E)</p>

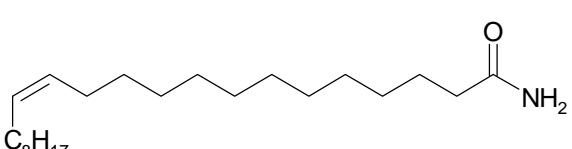
Diphenyl (2,4,6-trimethylbenzoyl) phosphine oxide, CAS # 75980-60-8	
Chemical Properties and Information	
<p>Chemical Name: Phosphine oxide, diphenyl(2,4,6-trimethylbenzoyl)-</p> <p>Synonyms: None</p> <p>Molecular Formula: $C_{22}H_{21}O_2P$</p> <p>Molecular Weight: 348.38</p> <p>Melting Point: 88-92 °C (M)</p> <p>Boiling Point: 474 °C (E)</p> <p>Vapor Pressure: <0.000001 mm Hg (E)</p> <p>Flash Point: NA °C (M)</p> <p>Water Solubility: 0.00699 g/L (E)</p> <p>Density: 1 g/cm³ (E)</p> <p>Log₁₀K_{ow}: 3.87 (E)</p> <p>Log₁₀K_{oc}: 2.895 (E)</p> <p>Log₁₀BCF: 2.713 (E)</p> <p>Function in ink: Initiator</p>	<p>Structure:</p>  <p>Henry's Law: <1E-8 atm-m³/mol (E)</p>

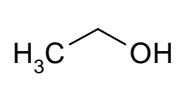
Dipropylene glycol diacrylate, CAS # 57472-68-1	
Chemical Properties and Information	
Chemical Name: 2-Propenoic acid, oxybis(methyl-2,1-ethanediyl) ester	
Synonyms: None	Structure:
Molecular Formula: C ₁₂ H ₁₈ O ₅	
Molecular Weight: 242.30	
Melting Point: -34 °C (E)	Henry's Law: <1E-8 atm-m ³ /mol (E)
Boiling Point: 256 °C (E)	
Vapor Pressure: 0.0194 mm Hg (E)	
Flash Point: NA °C (M)	
Water Solubility: 0.968 g/L (E)	
Density: 1 g/cm ³ (E)	
Log ₁₀ K _{ow} : 1.675 (E)	
Log ₁₀ K _{oc} : 1.0 (E)	
Log ₁₀ BCF: 1.043 (E)	
Function in ink: Curing agent	

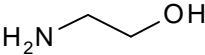
Dipropylene glycol methyl ether, CAS # 34590-94-8	
Chemical Properties and Information	
Chemical Name: 1,4-Dimethyl-3,6-dioxa-1-heptanol	
Synonyms: 1-(2-Methoxyisopropoxy)-2-propanol, (2-Methoxymethylethoxy)propanol	Structure:
Molecular Formula: C ₇ H ₁₆ O ₃	
Molecular Weight: 148.20	
Melting Point: -80 °C (M)	Henry's Law: <1E-8 atm-m ³ /mol (E)
Boiling Point: 189 °C (M)	
Vapor Pressure: 0.41 mm Hg (M)	
Flash Point: 74 °C (M)	
Water Solubility: 370 g/L	
Density: 0.948 g/cm ³ (M)	
Log ₁₀ K _{ow} : -1.99 (E)	
Log ₁₀ K _{oc} : 1.0 (E)	
Log ₁₀ BCF: -0.381 (E)	
Function in ink: Solvent	

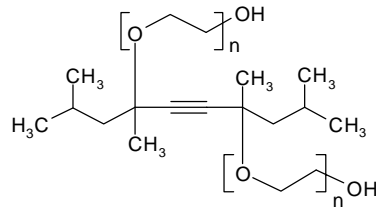
Distillates (petroleum), hydrotreated light, CAS # 64742-47-8	
Chemical Properties and Information	
Chemical Name: Distillates (petroleum), hydrotreated light	
Synonyms: Kerosene (petroleum), hydrotreated	Structure:
Molecular Formula: $C_9H_{20} - C_{16}H_{34}$	A complex combination of hydrocarbons obtained by treating a petroleum fraction with hydrogen in the presence of a catalyst. It consists of hydrocarbons having carbon numbers predominantly in the range of C9 and C16 and boiling in the range of approximately 150 °C to 290 °C.
Molecular Weight: >130	
Melting Point: -60 °C (E)	Henry's Law: NA atm-m ³ /mol (E)
Boiling Point: 150-290 °C (E)	
Vapor Pressure: <5 mm Hg (E)	
Flash Point: NA °C (M)	
Water Solubility: <0.003 g/L (E)	
Density: 0.8 g/cm ³ (E)	
Log ₁₀ K _{ow} : >4.7 (E)	
Log ₁₀ K _{oc} : NA (E)	
Log ₁₀ BCF: NA (E)	
Function in ink: Defoamer	

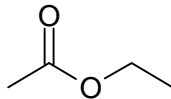
Distillates (petroleum), solvent-refined light paraffinic, CAS # 64741-89-5	
Chemical Properties and Information	
Chemical Name: Solvent refined light paraffinic distillate (petroleum)	
Synonyms: None	Structure:
Molecular Formula: $C_{15}H_{32} - C_{30}H_{62}$	A complex combination of hydrocarbons obtained as the raffinate from a solvent extraction process. It consists predominantly of saturated hydrocarbons having carbon numbers predominantly in the range of C15-C30 and produces a finished oil with a viscosity of less than 100 SUS at 100 °F (19cSt at 40 °C).
Molecular Weight: >200 (E)	
Melting Point: <25 °C (E)	Henry's Law: NA atm-m ³ /mol (E)
Boiling Point: >250 °C (E)	
Vapor Pressure: <0.03 mm Hg (E)	
Flash Point: NA °C (M)	
Water Solubility: <0.00001 g/L (E)	
Density: 0.8 g/cm ³ (E)	
Log ₁₀ K _{ow} : NA (E)	
Log ₁₀ K _{oc} : NA (E)	
Log ₁₀ BCF: NA (E)	
Function in ink: Defoamer	

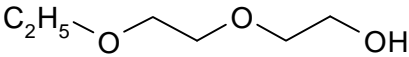
Erucamide, CAS # 112-84-5	
Chemical Properties and Information	
Chemical Name: cis-13-Docosenoamide Synonyms: Erucyl amide Molecular Formula: $C_{22}H_{43}NO$ Molecular Weight: 337.59 Melting Point: 79-81 °C (M) Boiling Point: 461 °C (E) Vapor Pressure: <0.000001 mm Hg (E) Flash Point: NA °C (M) Water Solubility: 0.0002 g/L (E) Density: 1 g/cm ³ (E) Log ₁₀ K _{ow} : 8.445 (E) Log ₁₀ K _{oc} : 6.071 (E) Log ₁₀ BCF: 6.188 (E) Function in ink: Vehicle	Structure:  Henry's Law: 2.84E-6 atm-m ³ /mol (E)

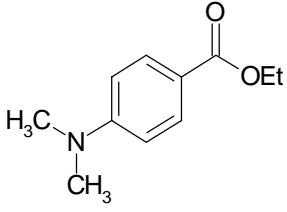
Ethanol, CAS # 64-17-5	
Chemical Properties and Information	
Chemical Name: Ethyl alcohol Synonyms: None Molecular Formula: C_2H_6O Molecular Weight: 46.07 Melting Point: -114 °C (M) Boiling Point: 78 °C (M) Vapor Pressure: 59.3 (M), 61.5 (E) mm Hg Flash Point: 8 °C (M) Water Solubility: 1000 (miscible) g/L (M) Density: 0.785 g/cm ³ (M) Log ₁₀ K _{ow} : -0.31 (M), -0.14 (E) Log ₁₀ K _{oc} : 0 (E) Log ₁₀ BCF: -0.466 (E) Function in ink: Solvent	Structure:  Henry's Law: 5.67E-6 atm-m ³ /mol (E)

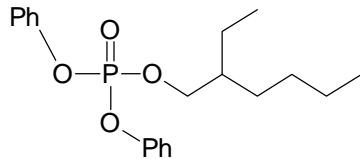
Ethanolamine, CAS # 141-43-5	
Chemical Properties and Information	
Chemical Name: 2-Aminoethanol Synonyms: Glycinol, 2-Hydroxyethylamine Molecular Formula: C ₂ H ₇ NO Molecular Weight: 61.08 Melting Point: 10.5 °C (M) Boiling Point: 170 °C (M) Vapor Pressure: 0.404 mm Hg (M) Flash Point: 93 °C (M) Water Solubility: Miscible g/L Density: 1.012 g/cm ³ (M) Log ₁₀ K _{ow} : -1.31 (M), -1.61 (E) Log ₁₀ K _{oc} : 0 (E) Log ₁₀ BCF: -1.22 (E) Function in ink: Buffer	Structure:  Henry's Law: <1E-8 atm-m ³ /mol (E)

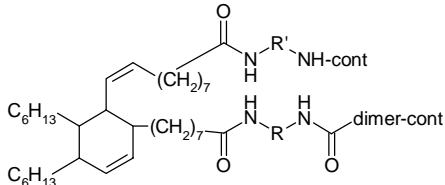
Ethoxylated tetramethyldecyldiol, CAS # 9014-85-1	
Chemical Properties and Information	
Chemical Name: Poly(oxy-1,2-ethanediyl), .alpha.,.alpha'.-[1,4-dimethyl-1,4-bis(2-methylpropyl)-2-butyne-1,4-diyl]bis[.omega.-hydroxy- Synonyms: Surfynol Molecular Formula: (C ₂ H ₄ O) _n (C ₂ H ₄ O) _n (C ₂ H ₄ O) _n C ₁₄ H ₂₆ O Molecular Weight: >500 (E) Melting Point: NA °C (E) Boiling Point: >300 °C (E) Vapor Pressure: <0.000001 mm Hg (E) Flash Point: NA °C (M) Water Solubility: Dispersible g/L (E) Density: 1 g/cm ³ (E) Log ₁₀ K _{ow} : NA (E) Log ₁₀ K _{oc} : NA (E) Log ₁₀ BCF: NA (E) Function in ink: Dispersant	Structure:  Henry's Law: NA atm-m ³ /mol (E)

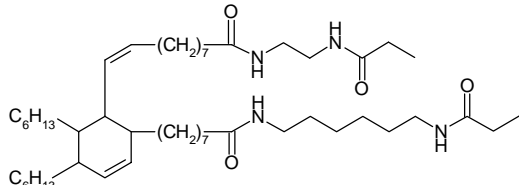
Ethyl acetate, CAS # 141-78-6	
Chemical Properties and Information	
Chemical Name: Acetic acid, ethyl ester Synonyms: Acetoxyethane, Ethyl ethanoate, Ethyl acetic ester Molecular Formula: C ₄ H ₈ O ₂ Molecular Weight: 88.11 Melting Point: -84 °C (M) Boiling Point: 76.5-77.5 °C (M) Vapor Pressure: 93.7 mm Hg (M) Flash Point: -3 °C (M); 7.2 °C (open cup) Water Solubility: 80 g/L (M) Density: 0.902 g/cm ³ (M) Log ₁₀ K _{ow} : 0.73 (M), 0.86 (E) Log ₁₀ K _{oc} : 0.788 (E) Log ₁₀ BCF: 0.325 (E) Function in ink: Solvent	Structure:  Henry's Law: 0.000158 atm-m ³ /mol (E)

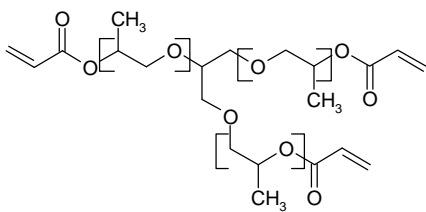
Ethyl carbitol, CAS # 111-90-0	
Chemical Properties and Information	
Chemical Name: 2-(2-Ethoxyethoxy)ethanol Synonyms: Diethylene glycol ethyl ether; 3,6-Dioxa-1-octanol Molecular Formula: C ₆ H ₁₄ O ₃ Molecular Weight: 134.18 Melting Point: -76 °C (E) Boiling Point: 202 °C (M) Vapor Pressure: 0.126 mm Hg (M) Flash Point: 96 °C (M) Water Solubility: 1000 (miscible) g/L (M) Density: 0.999 g/cm ³ (M) Log ₁₀ K _{ow} : -0.54 (M), -0.69 (E) Log ₁₀ K _{oc} : 0 (E) Log ₁₀ BCF: -0.64 (E) Function in ink: Solvent	Structure:  Henry's Law: <1E-8 atm-m ³ /mol (E)

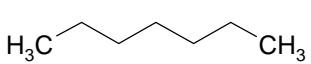
Ethyl 4-dimethylaminobenzoate, CAS # 10287-53-3	
Chemical Properties and Information	
<p>Chemical Name: Benzoic acid, 4-(dimethylamino)-, ethyl ester</p> <p>Synonyms: Perbenate</p> <p>Molecular Formula: $C_{11}H_{15}NO_2$</p> <p>Molecular Weight: 193.25</p> <p>Melting Point: 64-66 °C (M)</p> <p>Boiling Point: 269 °C (E)</p> <p>Vapor Pressure: 0.0044 mm Hg (E)</p> <p>Flash Point: NA °C (M)</p> <p>Water Solubility: 0.173 g/L (E)</p> <p>Density: 1 g/cm³ (E)</p> <p>Log₁₀K_{ow}: 2.89 (E)</p> <p>Log₁₀K_{oc}: 1.824 (E)</p> <p>Log₁₀BCF: 1.97 (E)</p> <p>Function in ink: Initiator</p>	<p>Structure:</p>  <p>Henry's Law: 7.33E-7 atm-m³/mol (E)</p>

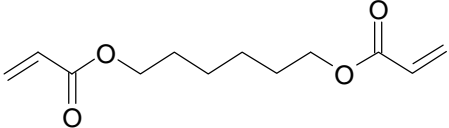
2-Ethylhexyl diphenyl phosphate, CAS # 1241-94-7	
Chemical Properties and Information	
<p>Chemical Name: Phosphoric acid, 2-ethylhexyl diphenyl ester</p> <p>Synonyms: None</p> <p>Molecular Formula: $C_{20}H_{27}O_4P$</p> <p>Molecular Weight: 362.41</p> <p>Melting Point: 87 °C (E)</p> <p>Boiling Point: 443 °C (E)</p> <p>Vapor Pressure: <0.000001 mm Hg (E)</p> <p>Flash Point: NA °C (M)</p> <p>Water Solubility: 0.0019 g/L (M)</p> <p>Density: 1 g/cm³ (E)</p> <p>Log₁₀K_{ow}: 5.73 (M), 4.205 (E)</p> <p>Log₁₀K_{oc}: 4.125 (E)</p> <p>Log₁₀BCF: NA (E)</p> <p>Function in ink: Plasticizer</p>	<p>Structure:</p>  <p>Henry's Law: 2.7E-7 atm-m³/mol (E)</p>

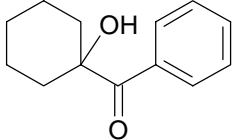
Fatty acid, dimer-based polyamide, CAS # NK	
Chemical Properties and Information	
<p>Chemical Name: NK</p> <p>Synonyms: NK</p> <p>Molecular Formula: C, H, N, O</p> <p>Molecular Weight: NAVG 2500</p> <p>Melting Point: NA °C (E)</p> <p>Boiling Point: >300 °C (E)</p> <p>Vapor Pressure: <0.000001 mm Hg (E)</p> <p>Flash Point: NA °C (M)</p> <p>Water Solubility: <0.000001 g/L (E)</p> <p>Density: 0.9 g/cm³ (E)</p> <p>Log₁₀K_{ow}: NA (E)</p> <p>Log₁₀K_{oc}: NA (E)</p> <p>Log₁₀BCF: NA (E)</p> <p>Function in ink: Resin</p>	<p>Structure:</p>  <p>R and R' are not known</p> <p>Henry's Law: NA atm-m³/mol (E)</p>

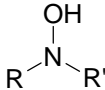
Fatty acids, C18-unsatd., dimers, polymers with ethylenediamine, hexamethylenediamine, and propionic acid, CAS # 67989-30-4	
Chemical Properties and Information	
<p>Chemical Name: Fatty acids, C18-unsatd., dimers, polymers with ethylenediamine, hexamethylenediamine, and propionic acid</p> <p>Synonyms: None</p> <p>Molecular Formula: C, H, N, O</p> <p>Molecular Weight: >600 (E)</p> <p>Melting Point: >100 °C (E)</p> <p>Boiling Point: >250 °C (E)</p> <p>Vapor Pressure: <0.000001 mm Hg (E)</p> <p>Flash Point: NA °C (M)</p> <p>Water Solubility: <0.000001 g/L (E)</p> <p>Density: 1 g/cm³ (E)</p> <p>Log₁₀K_{ow}: NA (E)</p> <p>Log₁₀K_{oc}: NA (E)</p> <p>Log₁₀BCF: NA (E)</p> <p>Function in ink: Resin</p>	<p>Structure:</p>  <p>Representative structure</p> <p>Henry's Law: NA atm-m³/mol (E)</p>

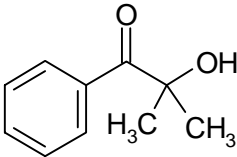
Glycerol propoxylate triacrylate, CAS # 52408-84-1	
Chemical Properties and Information	
<p>Chemical Name: Poly[oxy(methyl-1,2-ethanediyl)], .alpha.,.alpha',.alpha'',-1,2,3-propanetriyltris[.omega.-[(1-oxo-2-propenyl)oxy]-</p> <p>Synonyms: .alpha.,.alpha',.alpha'',-1,2,3-propanetriyltris[polypropylene glycol acrylate]</p> <p>Molecular Formula: $(C_3H_6O)_n(C_3H_6O)_n(C_3H_6O)_nC_{12}H_{14}O_6$</p> <p>Molecular Weight: >1000 (E)</p> <p>Melting Point: NA °C (M)</p> <p>Boiling Point: NA °C (M)</p> <p>Vapor Pressure: <0.000001 mm Hg (E)</p> <p>Flash Point: >110 °C (E)</p> <p>Water Solubility: dispersible g/L (E)</p> <p>Density: 1.064 g/cm³ (M)</p> <p>Log₁₀K_{ow}: NA (E)</p> <p>Log₁₀K_{oc}: NA (E)</p> <p>Log₁₀BCF: NA (E)</p> <p>Function in ink: Curing agent</p>	<p>Structure:</p>  <p>Henry's Law: NA atm-m³/mol (E)</p>

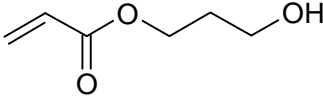
n-Heptane, CAS # 142-82-5	
Chemical Properties and Information	
<p>Chemical Name: Heptane</p> <p>Synonyms: None</p> <p>Molecular Formula: C₇H₁₆</p> <p>Molecular Weight: 100.21</p> <p>Melting Point: -90.7 °C (M)</p> <p>Boiling Point: 98.4 °C (M)</p> <p>Vapor Pressure: 46 mm Hg (M)</p> <p>Flash Point: -1 °C open; -4 °C closed cup</p> <p>Water Solubility: 0.0034 g/L (M)</p> <p>Density: 0.684 g/cm³ (M)</p> <p>Log₁₀K_{ow}: 4.66 (M), 3.78 (E)</p> <p>Log₁₀K_{oc}: 2.439 (E)</p> <p>Log₁₀BCF: 3.312 (E)</p> <p>Function in ink: Solvent</p>	<p>Structure:</p>  <p>Henry's Law: 2.27 atm-m³/mol (E)</p>

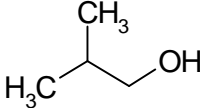
1,6-Hexanediol diacrylate, CAS # 13048-33-4	
Chemical Properties and Information	
Chemical Name: 2-Propenoic acid, 1,6-hexanediyl ester	
Synonyms: Acrylic acid, hexamethylene ester, HDODA	Structure:
Molecular Formula: $C_{12}H_{18}O_4$	
Molecular Weight: 226.28	
Melting Point: -30 °C (E)	Henry's Law: 3.7E-8 atm-m ³ /mol (E)
Boiling Point: 259 °C (E)	
Vapor Pressure: 0.0166 mm Hg (E)	
Flash Point: >110 °C (E)	
Water Solubility: 0.0748 g/L (E)	
Density: 1.01 g/cm ³ (M)	
Log ₁₀ K _{ow} : 3.079 (E)	
Log ₁₀ K _{oc} : 2.101 (E)	
Log ₁₀ BCF: 2.110 (E)	
Function in ink: Curing agent	

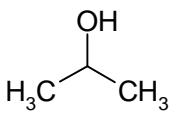
1-Hydroxycyclohexyl phenyl ketone, CAS # 947-19-3	
Chemical Properties and Information	
Chemical Name: (1-Hydroxycyclohexyl)phenylmethanone	
Synonyms: None	Structure:
Molecular Formula: $C_{13}H_{16}O_2$	
Molecular Weight: 204.27	
Melting Point: 47-50 °C (M)	Henry's Law: <1E-8 atm-m ³ /mol (E)
Boiling Point: 290 °C (M)	
Vapor Pressure: 0.000165 mm Hg (E)	
Flash Point: NA °C (M)	
Water Solubility: 1.882 g/L (E)	
Density: 1 g/cm ³ (E)	
Log ₁₀ K _{ow} : 2.405 (E)	
Log ₁₀ K _{oc} : 1.731 (E)	
Log ₁₀ BCF: 1.598 (E)	
Function in ink: Vehicle	

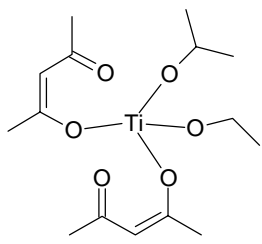
Hydroxylamine derivative, CAS # NK	
Chemical Properties and Information	
<p>Chemical Name: NK</p> <p>Synonyms: NK</p> <p>Molecular Formula: C, H, N, O</p> <p>Molecular Weight: 100-150 (E)</p> <p>Melting Point: NA °C (E)</p> <p>Boiling Point: 230-300 °C (E)</p> <p>Vapor Pressure: <0.01 mm Hg (E)</p> <p>Flash Point: NA °C (M)</p> <p>Water Solubility: <20 g/L (E)</p> <p>Density: 0.9 g/cm³ (E)</p> <p>Log₁₀K_{ow}: NA (E)</p> <p>Log₁₀K_{oc}: NA (E)</p> <p>Log₁₀BCF: NA (E)</p> <p>Function in ink: Inhibitor</p>	<p>Structure:</p> <div style="text-align: center;">  <p>R and R' are not specified</p> </div> <p>Henry's Law: NA atm-m³/mol (E)</p>

2-Hydroxy-2-methylpropiophenone, CAS # 7473-98-5	
Chemical Properties and Information	
<p>Chemical Name: 2-Hydroxy-2-methyl-1-phenyl-1-propanone</p> <p>Synonyms: None</p> <p>Molecular Formula: C₁₀H₁₂O₂</p> <p>Molecular Weight: 164.20</p> <p>Melting Point: 54.5 °C (E)</p> <p>Boiling Point: 235 °C (M)</p> <p>Vapor Pressure: 0.00429 mm Hg (E)</p> <p>Flash Point: >110 °C (E)</p> <p>Water Solubility: 25.3 g/L (E)</p> <p>Density: 1.077 g/cm³ (M)</p> <p>Log₁₀K_{ow}: 1.08 (E)</p> <p>Log₁₀K_{oc}: 1.0 (E)</p> <p>Log₁₀BCF: 0.591 (E)</p> <p>Function in ink: Solvent</p>	<p>Structure:</p> <div style="text-align: center;">  </div> <p>Henry's Law: 2.7E-6 atm-m³/mol (E)</p>

Hydroxypropyl acrylate, CAS # 25584-83-2	
Chemical Properties and Information	
<p>Chemical Name: 2-Propenoic acid, monoester with 1,2-propanediol</p> <p>Synonyms: Propyleneglycol acrylate, Acrylic acid, hydroxypropyl ester</p> <p>Molecular Formula: $C_6H_{10}O_3$</p> <p>Molecular Weight: 130.14</p> <p>Melting Point: $-4.4\text{ }^{\circ}\text{C}$ (E)</p> <p>Boiling Point: $191\text{ }^{\circ}\text{C}$ (M)</p> <p>Vapor Pressure: 0.124 mm Hg (E)</p> <p>Flash Point: $89\text{ }^{\circ}\text{C}$ (M)</p> <p>Water Solubility: 183.5 g/L (E)</p> <p>Density: 1.044 g/cm^3 (M)</p> <p>$\text{Log}_{10}K_{ow}$: 0.245 (E)</p> <p>$\text{Log}_{10}K_{oc}$: -0.044 (E)</p> <p>$\text{Log}_{10}BCF$: 0.904 (E)</p> <p>Function in ink: Reactive diluent</p>	<p>Structure:</p>  <p>Henry's Law: $<1\text{E-}8\text{ atm-m}^3/\text{mol}$ (E)</p>

Isobutanol, CAS # 78-83-1	
Chemical Properties and Information	
<p>Chemical Name: 2-Methyl-1-propanol</p> <p>Synonyms: 1-Hydroxymethylpropane, Isobutyl alcohol</p> <p>Molecular Formula: $C_4H_{10}O$</p> <p>Molecular Weight: 74.12</p> <p>Melting Point: $-108\text{ }^{\circ}\text{C}$ (M)</p> <p>Boiling Point: $107.89\text{ }^{\circ}\text{C}$ (M)</p> <p>Vapor Pressure: 10.4 mm Hg (M)</p> <p>Flash Point: $27\text{ }^{\circ}\text{C}$ closed cup (M)</p> <p>Water Solubility: 1000 (miscible) g/L (E)</p> <p>Density: 0.803 g/cm^3 (M)</p> <p>$\text{Log}_{10}K_{ow}$: 0.76 (M), 0.77 (E)</p> <p>$\text{Log}_{10}K_{oc}$: 0.311 (E)</p> <p>$\text{Log}_{10}BCF$: 0.348 (E)</p> <p>Function in ink: Solvent</p>	<p>Structure:</p>  <p>Henry's Law: $9.99\text{E-}6\text{ atm-m}^3/\text{mol}$ (E)</p>

Isopropanol, CAS # 67-63-0	
Chemical Properties and Information	
<p>Chemical Name: 2-Propanol</p> <p>Synonyms: Isopropyl alcohol, 2-propyl alcohol</p> <p>Molecular Formula: C₃H₈O</p> <p>Molecular Weight: 6.10</p> <p>Melting Point: -88.5 °C (M)</p> <p>Boiling Point: 82.5 °C (M)</p> <p>Vapor Pressure: 45.4 mm Hg (M)</p> <p>Flash Point: 11.7 °C closed cup (M)</p> <p>Water Solubility: 1000 (miscible) g/L (E)</p> <p>Density: 0.785 g/cm³ (M)</p> <p>Log₁₀K_{ow}: 0.05 (M), 0.28 (E)</p> <p>Log₁₀K_{oc}: 0.025 (E)</p> <p>Log₁₀BCF: -0.192 (E)</p> <p>Function in ink: Solvent</p>	<p>Structure:</p>  <p>Henry's Law: 7.52E-6 atm-m³/mol (E)</p>

Isopropoxyethoxytitanium bis(acetylacetonate), CAS # 68586-02-7	
Chemical Properties and Information	
<p>Chemical Name: Titanium, ethoxybis(2,4-pentanedionato-O,O')(2-propanolato)-</p> <p>Synonyms: 2-Propanol, titanium complex</p> <p>Molecular Formula: C₁₅H₂₆O₆Ti</p> <p>Molecular Weight: 350.25</p> <p>Melting Point: NA °C (E)</p> <p>Boiling Point: >250 °C (E)</p> <p>Vapor Pressure: <0.01 mm Hg (E)</p> <p>Flash Point: 30 °C (E)</p> <p>Water Solubility: Reacts</p> <p>Density: 1.1 g/cm³ (E)</p> <p>Log₁₀K_{ow}: NA (E)</p> <p>Log₁₀K_{oc}: NA (E)</p> <p>Log₁₀BCF: NA (E)</p> <p>Function in ink: Adhesion promoter</p>	<p>Structure:</p>  <p>Henry's Law: NA atm-m³/mol (E)</p>

2-Isopropylthioxanthone, CAS # 5495-84-1

Chemical Properties and Information

Chemical Name: 9H-Thioxanthen-9-one, 2-(1-methylethyl)-

Synonyms: None

Structure:

Molecular Formula: $C_{16}H_{14}OS$

Molecular Weight: 254.35

Melting Point: 141.7 °C (E)

Boiling Point: 379 °C (E)

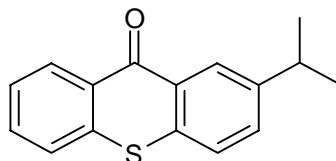
Vapor Pressure: 0.00002 mm Hg (E)

Flash Point: NA °C (M)

Water Solubility: 0.000032 g/L (E)

Density: 0.9 g/cm³ (E)Log₁₀K_{ow}: 5.54 (E)Log₁₀K_{oc}: 3.983 (E)Log₁₀BCF: 3.980 (E)

Function in ink: Photoinitiator

Henry's Law: 9.99E-8 atm-m³/mol (E)

4-Isopropylthioxanthone, CAS # 83846-86-0

Chemical Properties and Information

Chemical Name: 9H-Thioxanthen-9-one, 4-(1-methylethyl)-

Synonyms: None

Structure:

Molecular Formula: $C_{16}H_{14}OS$

Molecular Weight: 254.35

Melting Point: 141.7 °C (E)

Boiling Point: 379 °C (E)

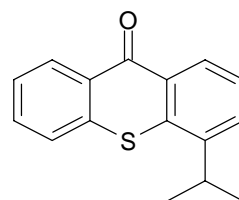
Vapor Pressure: 0.000002 mm Hg (E)

Flash Point: NA °C (M)

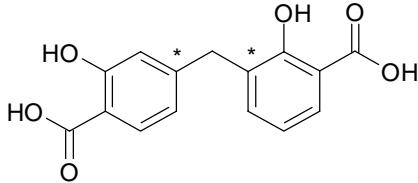
Water Solubility: 0.000032 g/L (E)

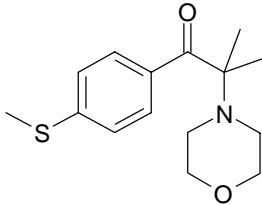
Density: 0.9 g/cm³ (E)Log₁₀K_{ow}: 5.54 (E)Log₁₀K_{oc}: 3.983 (E)Log₁₀BCF: 3.980 (E)

Function in ink: Photoinitiator

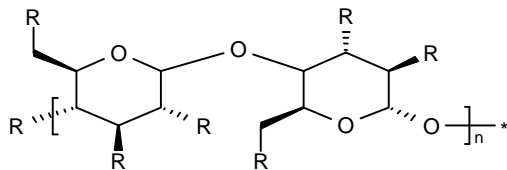
Henry's Law: 9.99E-8 atm-m³/mol (E)

Kaolin, CAS # 1332-58-7	
Chemical Properties and Information	
<p>Chemical Name: Kaolin</p> <p>Synonyms: Clays, white, Aluminum silicate hydroxide</p> <p>Molecular Formula: $\text{Al}_2\text{Si}_2\text{O}_5(\text{OH})_4$</p> <p>Molecular Weight: 258.16 (from Emp. Form.)</p> <p>Melting Point: $>500^\circ\text{C}$ (E)</p> <p>Boiling Point: NA $^\circ\text{C}$ (E)</p> <p>Vapor Pressure: <0.000001 mm Hg (E)</p> <p>Flash Point: NA $^\circ\text{C}$ (M)</p> <p>Water Solubility: <0.000001 g/L (E)</p> <p>Density: 2.75 g/cm^3 (E)</p> <p>$\text{Log}_{10}K_{ow}$: NA (E)</p> <p>$\text{Log}_{10}K_{oc}$: NA (E)</p> <p>$\text{Log}_{10}\text{BCF}$: NA (E)</p> <p>Function in ink: Pigment</p>	<p>Structure:</p> <p>A clay that is essentially kaolinite, a hydrated aluminum silicate. It has a high fusion point and is the most refractory of all clays.</p> <p>Henry's Law: NA $\text{atm}\cdot\text{m}^3/\text{mol}$ (E)</p>

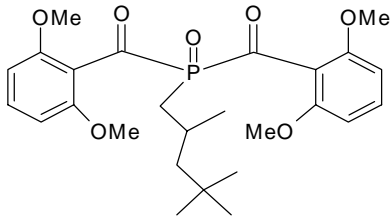
Methylenedisalicylic acid, CAS # 27496-82-8	
Chemical Properties and Information	
<p>Chemical Name: Benzoic acid, methylenebis[2-hydroxy-</p> <p>Synonyms: Methylenedisalicylic acid</p> <p>Molecular Formula: $\text{C}_{15}\text{H}_{12}\text{O}_6$</p> <p>Molecular Weight: 288.26</p> <p>Melting Point: 220°C (E)</p> <p>Boiling Point: 517°C (E)</p> <p>Vapor Pressure: <0.000001 mm Hg (E)</p> <p>Flash Point: NA $^\circ\text{C}$ (M)</p> <p>Water Solubility: 0.0076 g/L (E)</p> <p>Density: 0.9 g/cm^3 (E)</p> <p>$\text{Log}_{10}K_{ow}$: 4.52 (E)</p> <p>$\text{Log}_{10}K_{oc}$: 4.13 (E)</p> <p>$\text{Log}_{10}\text{BCF}$: 3.2 (E)</p> <p>Function in ink: NA, crosslinker (E)</p>	<p>Structure:</p>  <p>*Positions not specified</p> <p>Henry's Law: $<1\text{E-}6\text{ atm}\cdot\text{m}^3/\text{mol}$ (E)</p>

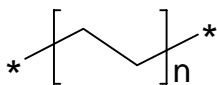
2-Methyl-4'-(methylthio)-2-morpholinopropiophenone, CAS # 71868-10-5	
Chemical Properties and Information	
Chemical Name: 2-Methyl-4'-(methylthio)-2-morpholinopropiophenone	
Synonyms: None	Structure:
Molecular Formula: $C_{15}H_{21}NO_2S$	
Molecular Weight: 279.40	
Melting Point: 74-76 °C (M)	Henry's Law: $<1E-8$ atm-m ³ /mol (E)
Boiling Point: 372 °C (E)	
Vapor Pressure: 0.0000135 mm Hg (E)	
Flash Point: NA °C (M)	
Water Solubility: 1.077 g/L (E)	
Density: 1 g/cm ³ (E)	
Log ₁₀ K _{ow} : 2.726 (E)	
Log ₁₀ K _{oc} : 2.552 (E)	
Log ₁₀ BCF: 1.842 (E)	
Function in ink: Antioxidant, photoinitiator	

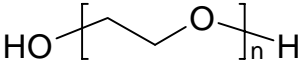
Mineral oil, CAS # 8012-95-1	
Chemical Properties and Information	
Chemical Name: Mineral oil	
Synonyms: Paraffin oils	Structure:
Molecular Formula: C, H	Liquid hydrocarbons from petroleum.
Molecular Weight: >100 (E)	
Melting Point: <25 °C (E)	Henry's Law: NA atm-m ³ /mol (E)
Boiling Point: >200 °C (E)	
Vapor Pressure: <0.01 mm Hg (E)	
Flash Point: NA °C (M)	
Water Solubility: <0.0001 g/L (E)	
Density: 0.85 g/cm ³ (E)	
Log ₁₀ K _{ow} : NA (E)	
Log ₁₀ K _{oc} : NA (E)	
Log ₁₀ BCF: NA (E)	
Function in ink: Vehicle	

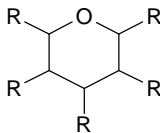
Nitrocellulose, CAS # 9004-70-0	
Chemical Properties and Information	
<p>Chemical Name: Cellulose nitrate</p> <p>Synonyms: None</p> <p>Molecular Formula: C, H, N, O</p> <p>Molecular Weight: >1000 (E)</p> <p>Melting Point: NA °C (M)</p> <p>Boiling Point: >350 °C (E)</p> <p>Vapor Pressure: <0.000001 mm Hg (E)</p> <p>Flash Point: NA °C (M)</p> <p>Water Solubility: 1000 (miscible) g/L (E)</p> <p>Density: 1 g/cm³ (E)</p> <p>Log₁₀K_{ow}: NA (E)</p> <p>Log₁₀K_{oc}: NA (E)</p> <p>Log₁₀BCF: NA (E)</p> <p>Function in ink: Resin</p>	<p>Structure:</p>  <p>R = OH or NO₂</p> <p>Henry's Law: NA atm-m³/mol (E)</p>

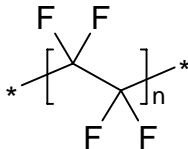
Paraffin wax, CAS # 8002-74-2	
Chemical Properties and Information	
<p>Chemical Name: Paraffin waxes and hydrocarbon waxes</p> <p>Synonyms: Paraffin</p> <p>Molecular Formula: C_nH_{2n+2} (n>20, TYPCL)</p> <p>Molecular Weight: >280 (TYPCL)</p> <p>Melting Point: 50-57 °C (M)</p> <p>Boiling Point: >250 °C (E)</p> <p>Vapor Pressure: <0.0004 mm Hg (E)</p> <p>Flash Point: NA °C (M)</p> <p>Water Solubility: <0.000001 g/L (E)</p> <p>Density: about 0.9 g/cm³ (E)</p> <p>Log₁₀K_{ow}: NA (E)</p> <p>Log₁₀K_{oc}: NA (E)</p> <p>Log₁₀BCF: NA (E)</p> <p>Function in ink: Wax</p>	<p>Structure:</p> <p>A complex combination of hydrocarbons obtained from petroleum fractions (by solvent crystallization or the sweating process) or from the catalytic hydrogenation of carbon monoxide. It consists predominantly of straight chain hydrocarbons having carbon numbers predominantly greater than C20.</p> <p>Henry's Law: NA atm-m³/mol (E)</p>

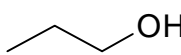
Phosphine oxide, bis(2,6-dimethoxybenzoyl)(2,4,4-trimethylpentyl)-, CAS # 145052-34-2	
Chemical Properties and Information	
<p>Chemical Name: Phosphine oxide, bis(2,6-dimethoxybenzoyl)(2,4,4-trimethylpentyl)-</p> <p>Synonyms: None</p> <p>Molecular Formula: $C_{26}H_{35}O_7P$</p> <p>Molecular Weight: 490.54</p> <p>Melting Point: 90 °C (E)</p> <p>Boiling Point: 480 °C (E)</p> <p>Vapor Pressure: <0.000001 mm Hg (E)</p> <p>Flash Point: NA °C (M)</p> <p>Water Solubility: 0.00054 g/L (E)</p> <p>Density: 1 g/cm³ (E)</p> <p>Log₁₀K_{ow}: 3.724 (E)</p> <p>Log₁₀K_{oc}: 2.528 (E)</p> <p>Log₁₀BCF: 2.60 (E)</p> <p>Function in ink: Plasticizer</p>	<p>Structure:</p>  <p>Henry's Law: <1E-8 atm-m³/mol (E)</p>

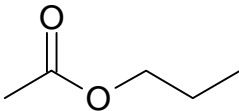
Polyethylene, CAS # 9002-88-4	
Chemical Properties and Information	
<p>Chemical Name: Polyethylene</p> <p>Synonyms: Ethylene polymer</p> <p>Molecular Formula: $(C_2H_4)_n$</p> <p>Molecular Weight: 1500 -100,000</p> <p>Melting Point: 85-110 °C (M)</p> <p>Boiling Point: NA °C (M)</p> <p>Vapor Pressure: <0.000001 mm Hg (E)</p> <p>Flash Point: NA °C (M)</p> <p>Water Solubility: <0.000001 g/L (E)</p> <p>Density: 0.92 g/cm³ (M)</p> <p>Log₁₀K_{ow}: NA (E)</p> <p>Log₁₀K_{oc}: NA (E)</p> <p>Log₁₀BCF: NA (E)</p> <p>Function in ink: Wax</p>	<p>Structure:</p>  <p>Henry's Law: NA atm-m³/mol (E)</p>

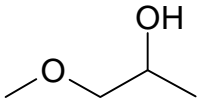
Polyethylene glycol, CAS # 25322-68-3	
Chemical Properties and Information	
Chemical Name: Poly(oxy-1,2-ethanediyl), .alpha.-hydro-.omega.-hydroxy- Synonyms: PEG, Polyglycol, Polyoxyethylene Molecular Formula: $(C_2H_4O)_n$ Molecular Weight: 200 - 9000 (TYPCL) Melting Point: -65 °C (M) Boiling Point: >250 °C (E) Vapor Pressure: <0.000001 mm Hg (E) Flash Point: NA °C (M) Water Solubility: 1000 (miscible) g/L (E) Density: 1.1 g/cm ³ (E) Log ₁₀ K _{ow} : NA (E) Log ₁₀ K _{oc} : NA (E) Log ₁₀ BCF: NA (E) Function in ink: Dispersant	Structure:  Henry's Law: NA atm-m ³ /mol (E)

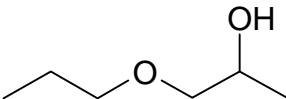
Polyol derivative A, CAS # NK	
Chemical Properties and Information	
Chemical Name: Polyol derivative A Synonyms: None Molecular Formula: C, H, O Molecular Weight: >400 Melting Point: >280 °C (E) Boiling Point: >600 °C (E) Vapor Pressure: <0.000001 mm Hg (E) Flash Point: NA °C (M) Water Solubility: >300 g/L (E) Density: 1 g/cm ³ (E) Log ₁₀ K _{ow} : -2.76 (E) Log ₁₀ K _{oc} : 1.0 (E) Log ₁₀ BCF: -2.33 (E) Function in ink: Resin	Structure:  R = OH or other Henry's Law: <1E-8 atm-m ³ /mol (E)

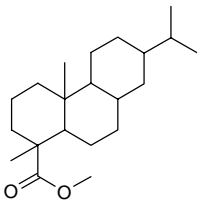
Polytetrafluoroethylene, CAS # 9002-84-0	
Chemical Properties and Information	
<p>Chemical Name: Polytetrafluoroethylene</p> <p>Synonyms: PTFE, Polytef, Teflon</p> <p>Molecular Formula: $(C_2F_4)_n$</p> <p>Molecular Weight: >1000 (E)</p> <p>Melting Point: 321 (gels) °C (M)</p> <p>Boiling Point: monomer gas formed at 400 °C (M)</p> <p>Vapor Pressure: <0.000001 mm Hg (E)</p> <p>Flash Point: NA °C (M)</p> <p>Water Solubility: <0.000001 g/L (E)</p> <p>Density: 2.25 g/cm³ (M)</p> <p>Log₁₀K_{ow}: NA (E)</p> <p>Log₁₀K_{oc}: NA (E)</p> <p>Log₁₀BCF: NA (E)</p> <p>Function in ink: Wax</p>	<p>Structure:</p>  <p>Henry's Law: NA atm-m³/mol (E)</p>

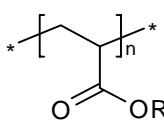
Propanol, CAS # 71-23-8	
Chemical Properties and Information	
<p>Chemical Name: 1-Propanol</p> <p>Synonyms: n-Propyl alcohol, 1-hydroxypropane</p> <p>Molecular Formula: C₃H₈O</p> <p>Molecular Weight: 60.10</p> <p>Melting Point: -127 °C (M)</p> <p>Boiling Point: 97.2 °C (M)</p> <p>Vapor Pressure: 21 (M), 23.4 (E) mm Hg</p> <p>Flash Point: 15 °C (M)</p> <p>Water Solubility: 1000 (miscible) g/L (E)</p> <p>Density: 0.804 g/cm³ (M)</p> <p>Log₁₀K_{ow}: 0.25 (M), 0.35 (E)</p> <p>Log₁₀K_{oc}: 0.122 (E)</p> <p>Log₁₀BCF: -0.04 (E)</p> <p>Function in ink: Solvent</p>	<p>Structure:</p>  <p>Henry's Law: 7.52E-6 atm-m³/mol (E)</p>

Propyl acetate, CAS # 109-60-4	
Chemical Properties and Information	
<p>Chemical Name: Acetic acid, propyl ester</p> <p>Synonyms: 1-Acetoxyp propane</p> <p>Molecular Formula: C₅H₁₀O₂</p> <p>Molecular Weight: 102.13</p> <p>Melting Point: -92 °C (M)</p> <p>Boiling Point: 101.6 °C (M)</p> <p>Vapor Pressure: 33.7 (M), 34.4 (E) mm Hg</p> <p>Flash Point: 14 °C closed cup (M)</p> <p>Water Solubility: 18.9 (M), 15.5 (E) g/L</p> <p>Density: 0.888 g/cm³</p> <p>Log₁₀K_{ow}: 1.24 (M), 1.36 (E)</p> <p>Log₁₀K_{oc}: 1.053 (E)</p> <p>Log₁₀BCF: 0.712 (E)</p> <p>Function in ink: Solvent</p>	<p>Structure:</p>  <p>Henry's Law: 0.000223 atm-m³/mol (E)</p>

Propylene glycol methyl ether, CAS # 107-98-2	
Chemical Properties and Information	
<p>Chemical Name: 1-Methoxy-2-propanol</p> <p>Synonyms: None</p> <p>Molecular Formula: C₄H₁₀O₂</p> <p>Molecular Weight: 90.12</p> <p>Melting Point: -142 °C (M)</p> <p>Boiling Point: 118-119 °C (M)</p> <p>Vapor Pressure: 12.5 mm Hg (M)</p> <p>Flash Point: 33 °C (M)</p> <p>Water Solubility: 1000 g/L (miscible) (E)</p> <p>Density: 0.922 g/cm³ (M)</p> <p>Log₁₀K_{ow}: -0.489 (E)</p> <p>Log₁₀K_{oc}: 0 (E)</p> <p>Log₁₀BCF: -0.602 (E)</p> <p>Function in ink: Solvent</p>	<p>Structure:</p>  <p>Henry's Law: 1.81E-8 atm-m³/mol (E)</p>

Propylene glycol propyl ether, CAS # 1569-01-3	
Chemical Properties and Information	
Chemical Name: 1-Propoxy-2-propanol	Structure:
Synonyms: None	
Molecular Formula: C ₆ H ₁₄ O ₂	
Molecular Weight: 118.18	
Melting Point: -80 °C (M)	
Boiling Point: 140-160 °C (M)	
Vapor Pressure: 1.7 mm Hg (M)	
Flash Point: 48 °C (M)	
Water Solubility: 125 g/L (E)	
Density: 0.885 g/cm ³ (M)	
Log ₁₀ K _{ow} : 0.49 (E)	
Log ₁₀ K _{oc} : 0 (E)	
Log ₁₀ BCF: 0.145 (E)	
Function in ink: Solvent	
	Henry's Law: 3.46E-8 atm-m ³ /mol (E)

Resin acids, hydrogenated, methyl esters, CAS # 8050-15-5	
Chemical Properties and Information	
Chemical Name: Resin acids and rosin acids, hydrogenated, Me esters	Structure:
Synonyms: Hydrogenated resin acid Me esters	
Molecular Formula: C ₂₁ H ₃₆ O ₂ (TYPCL)	 <p>Representative structure</p>
Molecular Weight: 320.5	
Melting Point: 113 °C (E)	
Boiling Point: >350 °C (E)	
Vapor Pressure: <0.00002 mm Hg (E)	
Flash Point: NA °C (M)	
Water Solubility: <0.00001 g/L (E)	
Density: 1 g/cm ³ (E)	
Log ₁₀ K _{ow} : 6.918 (E)	
Log ₁₀ K _{oc} : 5.07 (E)	
Log ₁₀ BCF: 5.028 (E)	
Function in ink: Resin	Henry's Law: NA atm-m ³ /mol (E)

Resin, acrylic, CAS # NK	
Chemical Properties and Information	
Chemical Name: NK	Structure:  $\text{R} = \text{H and/or other}$
Synonyms: NK	
Molecular Formula: C, H, O	
Molecular Weight: NAVG >30,000 (E)	
Melting Point: NA °C (E)	
Boiling Point: >350 °C (E)	
Vapor Pressure: <0.000001 mm Hg (E)	
Flash Point: NA °C (M)	
Water Solubility: >500 g/L (E)	
Density: 1 g/cm ³ (E)	
Log ₁₀ K _{ow} : NA (E)	
Log ₁₀ K _{oc} : NA (E)	
Log ₁₀ BCF: NA (E)	
Function in ink: Resin	
	Henry's Law: NA atm-m ³ /mol (E)

Resin, miscellaneous, CAS # NK	
Chemical Properties and Information	
Chemical Name: NK	Structure: Unknown
Synonyms: NK	
Molecular Formula: C, H, O	
Molecular Weight: NAVG 30,000 (E)	
Melting Point: NA °C (E)	
Boiling Point: >350 °C (E)	
Vapor Pressure: <0.000001 mm Hg (E)	
Flash Point: NA °C (M)	
Water Solubility: <0.000001 g/L (E)	
Density: 1 g/cm ³ (E)	
Log ₁₀ K _{ow} : NA (E)	
Log ₁₀ K _{oc} : NA (E)	
Log ₁₀ BCF: NA (E)	
Function in ink: Resin	
	Henry's Law: NA atm-m ³ /mol (E)

Rosin, fumarated, polymer with diethylene glycol and pentaerythritol,
CAS # 68152-50-1

Chemical Properties and Information

Chemical Name: Rosin, fumarates, polymer with diethylene glycol and pentaerythritol

Synonyms: None

Molecular Formula: $(C_5H_{12}O_4 \cdot C_4H_{10}O_3 \cdot \text{Unspecified})_x$

Molecular Weight: >1000 (E)

Melting Point: NA °C (E)

Boiling Point: >300 °C (E)

Vapor Pressure: <0.000001 mm Hg (E)

Flash Point: NA °C (M)

Water Solubility: <0.001 g/L (E)

Density: 1 g/cm³ (E)

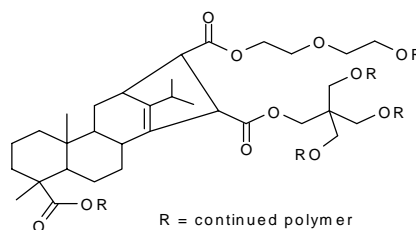
Log₁₀K_{ow}: NA (E)

Log₁₀K_{oc}: NA (E)

Log₁₀BCF: NA (E)

Function in ink: Resin, vehicle

Structure:



Henry's Law: NA atm-m³/mol (E)

Rosin, fumarated, polymer with pentaerythritol, 2-propenoic acid, ethenylbenzene,
and (1-methylethylenyl)benzene, CAS # NK

Chemical Properties and Information

Chemical Name: Rosin, fumarated, polymer with pentaerythritol, 2-propenoic acid, ethenylbenzene, and (1-methylethylenyl)benzene

Synonyms: None

Molecular Formula: $(C_5H_{12}O_4 \cdot \text{unspecified})_x$

Molecular Weight: NAVG 2290

Melting Point: >100 °C (E)

Boiling Point: NA °C (E)

Vapor Pressure: <0.000001 mm Hg (E)

Flash Point: NA °C (M)

Water Solubility: <0.000001 g/L (E)

Density: 1 g/cm³ (E)

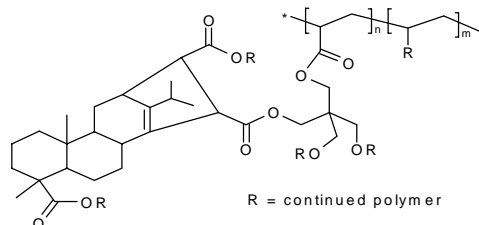
Log₁₀K_{ow}: NA (E)

Log₁₀K_{oc}: NA (E)

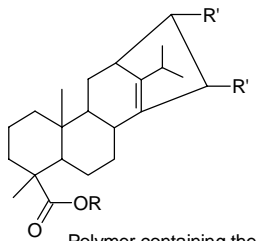
Log₁₀BCF: NA (E)

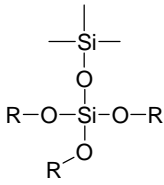
Function in ink: Resin

Structure:



Henry's Law: NA atm-m³/mol (E)

Rosin, polymerized, CAS # 65997-05-9	
Chemical Properties and Information	
<p>Chemical Name: Rosin, polymd.</p> <p>Synonyms: Gum rosin WW, polymers; Wood rosin, Poly-pale resin</p> <p>Molecular Formula: C, H, O</p> <p>Molecular Weight: NAVG >1000 (E)</p> <p>Melting Point: NA °C (E)</p> <p>Boiling Point: >250 °C (E)</p> <p>Vapor Pressure: <0.000001 mm Hg (E)</p> <p>Flash Point: NA °C (M)</p> <p>Water Solubility: <0.000001 g/L (E)</p> <p>Density: 1 g/cm³ (E)</p> <p>Log₁₀K_{ow}: NA (E)</p> <p>Log₁₀K_{oc}: NA (E)</p> <p>Log₁₀BCF: NA (E)</p> <p>Function in ink: Resin</p>	<p>Structure:</p>  <p>Polymer containing the above resin</p> <p>Henry's Law: NA atm-m³/mol (E)</p>

Silanamine, 1,1,1-trimethyl-N-(trimethylsilyl)-, hydrolysis products with silica, CAS # 68909-20-6	
Chemical Properties and Information	
<p>Chemical Name: Silanamine, 1,1,1-trimethyl-N-(trimethylsilyl)-, hydrolysis products with silica</p> <p>Synonyms: None</p> <p>Molecular Formula: C, H, O, Si</p> <p>Molecular Weight: >10000 (E)</p> <p>Melting Point: >500 °C (E)</p> <p>Boiling Point: NA °C (E)</p> <p>Vapor Pressure: <0.000001 mm Hg (E)</p> <p>Flash Point: NA °C (M)</p> <p>Water Solubility: <0.000001 g/L (E)</p> <p>Density: 1.5 g/cm³ (E)</p> <p>Log₁₀K_{ow}: NA (E)</p> <p>Log₁₀K_{oc}: NA (E)</p> <p>Log₁₀BCF: NA (E)</p> <p>Function in ink: Defoamer</p>	<p>Structure:</p>  <p>R = H or continued polymer</p> <p>Henry's Law: NA atm-m³/mol (E)</p>

Silica, CAS # 7631-86-9	
Chemical Properties and Information	
Chemical Name: Silicon dioxide Synonyms: Silicic anhydride Molecular Formula: SiO ₂ Molecular Weight: >10,000 (60.09 from Emp. Form.) Melting Point: 1550 °C (M) Boiling Point: NA °C (E) Vapor Pressure: <0.000001 mm Hg (E) Flash Point: NA °C (M) Water Solubility: <0.0001 g/L (E) Density: 2.2 (amorphous) g/cm ³ (M); 2.65 (quartz) g/cm ³ Log ₁₀ K _{ow} : NA (E) Log ₁₀ K _{oc} : NA (E) Log ₁₀ BCF: NA (E) Function in ink: NA, defoamer (E)	Structure: $\text{O}=\text{Si}=\text{O}$ Henry's Law: NA atm-m ³ /mol (E)

Silicone oil, CAS # 63148-62-9	
Chemical Properties and Information	
Chemical Name: Siloxanes and silicones, di-Me Synonyms: .alpha.-Methyl-.omega.-methoxypolydimethyl siloxane, Poly(dimethylsiloxane) Molecular Formula: (Si(CH ₃) ₂ O) _n Molecular Weight: >1000 (E) Melting Point: <-40 °C (E) Boiling Point: >450 °C (E) Vapor Pressure: <0.000001 mm Hg (E) Flash Point: 315 °C (M) Water Solubility: <0.000001 g/L (E) Density: 0.963 g/cm ³ Log ₁₀ K _{ow} : NA (E) Log ₁₀ K _{oc} : NA (E) Log ₁₀ BCF: NA (E) Function in ink: NA, defoamer (E)	Structure: $\text{RO}-\left[\text{Si}-\text{O}\right]_p-\text{R}$ <div style="text-align: center;"> $\text{R} = \text{H or continued polymer}$ </div> Henry's Law: atm-m ³ /mol (E)

Siloxanes and silicones, di-Me, 3-hydroxypropyl Me, ethers with polyethylene glycol acetate, CAS # 70914-12-4

Chemical Properties and Information

Chemical Name: Siloxanes and silicones, di-Me, 3-hydroxypropyl Me, esters with polyethylene glycol acetate

Synonyms: None

Molecular Formula: C, H, O, Si

Molecular Weight: >1000 (E)

Melting Point: >100 °C (E)

Boiling Point: >350 °C (E)

Vapor Pressure: <0.000001 mm Hg (E)

Flash Point: NA °C (M)

Water Solubility: Dispersible g/L (E)

Density: 1 g/cm³ (E)

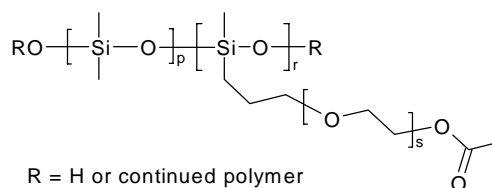
Log₁₀K_{ow}: NA (E)

Log₁₀K_{oc}: NA (E)

Log₁₀BCF: NA (E)

Function in ink: wetting agent, defoamer

Structure:



Henry's Law: NA atm-m³/mol (E)

Solvent naphtha (petroleum), light aliphatic, CAS # 64742-89-8

Chemical Properties and Information

Chemical Name: Solvent naphtha(petroleum), light aromatic

Synonyms: Skellysolve

Molecular Formula: C₅H₁₀-C₁₀H₂₂

Molecular Weight: 100 (E)

Melting Point: <-80 °C (E)

Boiling Point: 35-160 °C (E)

Vapor Pressure: <355 mm Hg (E)

Flash Point: NA °C (M)

Water Solubility: <0.2 g/L (E)

Density: 0.8 g/cm³ (E)

Log₁₀K_{ow}: NA (E)

Log₁₀K_{oc}: NA (E)

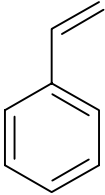
Log₁₀BCF: NA (E)

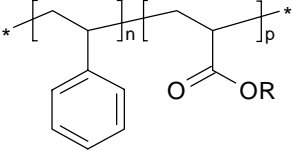
Function in ink: Solvent

Structure:

Complex combination of hydrocarbons obtained from the distillation of crude oil or natural gas. It consists predominantly of saturated hydrocarbons having carbon numbers predominantly in the range of C5 through C10 and boiling in the range of approximately 35 °C to 160 °C.

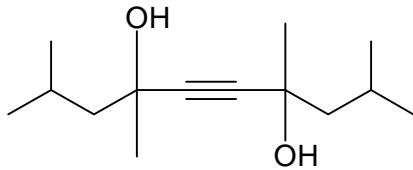
Henry's Law: NA atm-m³/mol (E)

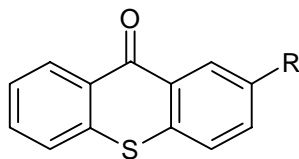
Styrene, CAS # 100-42-5	
Chemical Properties and Information	
Chemical Name: Ethenylbenzene Synonyms: Vinylbenzene Molecular Formula: C ₈ H ₈ Molecular Weight: 104.15 Melting Point: -31 °C (M) Boiling Point: 145-146 °C (M) Vapor Pressure: 6.4 mm Hg (M) Flash Point: 31 °C (M) Water Solubility: 0.31 g/L (M) Density: 0.909 g/cm ³ (M) Log ₁₀ K _{ow} : 2.95 (M), 2.89 (E) Log ₁₀ K _{oc} : 2.714 (E) Log ₁₀ BCF: 2.102 (E) Function in ink: Curing agent	Structure:  Henry's Law: 0.00281 atm-m ³ /mol (E)

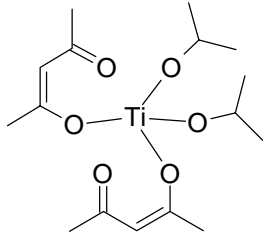
Styrene acrylic acid polymer #1, CAS # NK	
Chemical Properties and Information	
Chemical Name: NK Synonyms: Styrene acrylic acid polymer Molecular Formula: C, H, O Molecular Weight: NAVG > 30,000 Melting Point: NA °C (E) Boiling Point: >300 °C (E) Vapor Pressure: <0.000001 mm Hg (E) Flash Point: NA °C (M) Water Solubility: <0.000001 g/L (E) Density: 1 g/cm ³ (E) Log ₁₀ K _{ow} : NA (E) Log ₁₀ K _{oc} : NA (E) Log ₁₀ BCF: NA (E) Function in ink: Resin	Structure:  R = H and/or other Henry's Law: NA atm-m ³ /mol (E)

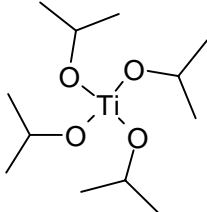
Styrene acrylic acid polymer #2, CAS # NK	
Chemical Properties and Information	
<p>Chemical Name: NK</p> <p>Synonyms: Styrene acrylic adic polymer</p> <p>Molecular Formula: C, H, O</p> <p>Molecular Weight: NAVG >10,000</p> <p>Melting Point: NA °C (E)</p> <p>Boiling Point: >300 °C (E)</p> <p>Vapor Pressure: <0.000001 mm Hg (E)</p> <p>Flash Point: NA °C (M)</p> <p>Water Solubility: <0.000001 g/L (E)</p> <p>Density: 1 g/cm³ (E)</p> <p>Log₁₀K_{ow}: NA (E)</p> <p>Log₁₀K_{oc}: NA (E)</p> <p>Log₁₀BCF: NA (E)</p> <p>Function in ink: Resin</p>	<p>Structure:</p> <p>R = H and/or other</p> <p>Henry's Law: NA atm-m³/mol (E)</p>

Styrene acrylic acid resin, CAS # NK	
Chemical Properties and Information	
<p>Chemical Name: NK</p> <p>Synonyms: Styrene acrylic acid resin</p> <p>Molecular Formula: C, H, O</p> <p>Molecular Weight: >10000</p> <p>Melting Point: NA °C (E)</p> <p>Boiling Point: >300 °C (E)</p> <p>Vapor Pressure: <0.000001 mm Hg (E)</p> <p>Flash Point: NA °C (M)</p> <p>Water Solubility: <0.000001 g/L (E)</p> <p>Density: 1 g/cm³ (E)</p> <p>Log₁₀K_{ow}: NA (E)</p> <p>Log₁₀K_{oc}: NA (E)</p> <p>Log₁₀BCF: NA (E)</p> <p>Function in ink: Resin</p>	<p>Structure:</p> <p>R = H or other</p> <p>Henry's Law: NA atm-m³/mol (E)</p>

Tetramethyldecyndiol, CAS # 126-86-3	
Chemical Properties and Information	
<p>Chemical Name: 2,4,7,9-Tetramethyl-5-decyne-4,7-diol</p> <p>Synonyms: Surfynol 104</p> <p>Molecular Formula: $C_{14}H_{26}O_2$</p> <p>Molecular Weight: 226.36</p> <p>Melting Point: 42-44 °C (M)</p> <p>Boiling Point: 255 °C (M)</p> <p>Vapor Pressure: 0.00099 mm Hg (E)</p> <p>Flash Point: >110 °C (E)</p> <p>Water Solubility: 0.052 g/L (E)</p> <p>Density: 1 g/cm³ (E)</p> <p>Log₁₀K_{ow}: 3.609 (E)</p> <p>Log₁₀K_{oc}: 1.328 (E)</p> <p>Log₁₀BCF: 2.513 (E)</p> <p>Function in ink: Solvent</p>	<p>Structure:</p>  <p>Henry's Law: 2.44E-7 atm-m³/mol (E)</p>

Thioxanthone derivative, CAS # NK	
Chemical Properties and Information	
<p>Chemical Name: NK</p> <p>Synonyms: NK</p> <p>Molecular Formula: C, H, O, S</p> <p>Molecular Weight: 260 (E) (for R = iPr)</p> <p>Melting Point: 150 °C (E)</p> <p>Boiling Point: >350 °C (E)</p> <p>Vapor Pressure: <0.00001 mm Hg (E)</p> <p>Flash Point: NA °C (M)</p> <p>Water Solubility: <0.00005 g/L (E)</p> <p>Density: 0.9 g/cm³ (E)</p> <p>Log₁₀K_{ow}: NA (E)</p> <p>Log₁₀K_{oc}: NA (E)</p> <p>Log₁₀BCF: NA (E)</p> <p>Function in ink: Photoinitiator</p>	<p>Structure:</p>  <p>R position and content unspecified</p> <p>Henry's Law: NA atm-m³/mol (E)</p>

Titanium diisopropoxide bis(2,4-pentanedionate) CAS# 17927-72-9	
Chemical Properties and Information	
<p>Chemical Name: Titanium, bis(2,4-pentanedionato-.kappa.O,.kappa.O')bis(2-propanolato)-</p> <p>Synonyms: 2-Propanol, titanium complex; diisopropoxytitanium bis(acetylacetonate)</p> <p>Molecular Formula: $C_{16}H_{28}O_6Ti$</p> <p>Molecular Weight: 364.30</p> <p>Melting Point: NA °C (E)</p> <p>Boiling Point: >250 °C (E)</p> <p>Vapor Pressure: <0.01 mm Hg (E)</p> <p>Flash Point: 12 °C (M)</p> <p>Water Solubility: Reacts</p> <p>Density: 0.995 g/cm³ (M)</p> <p>Log₁₀K_{ow}: NA (E)</p> <p>Log₁₀K_{oc}: NA (E)</p> <p>Log₁₀BCF: NA (E)</p> <p>Function in ink: Adhesion promoter</p>	<p>Structure:</p>  <p>Henry's Law: NA atm-m³/mol (E)</p>

Titanium isopropoxide, CAS# 546-68-9	
Chemical Properties and Information	
<p>Chemical Name: 2-Propanol, titanium(4+) salt</p> <p>Synonyms: Tetraisopropyl titanate</p> <p>Molecular Formula: $C_{12}H_{26}O_4Ti$</p> <p>Molecular Weight: 284.26</p> <p>Melting Point: 18-20 °C (M)</p> <p>Boiling Point: 232 °C (M)</p> <p>Vapor Pressure: 0.11 mm Hg (E)</p> <p>Flash Point: 22 °C (M)</p> <p>Water Solubility: Reacts</p> <p>Density: 0.963 g/cm³ (M)</p> <p>Log₁₀K_{ow}: NA (E)</p> <p>Log₁₀K_{oc}: NA (E)</p> <p>Log₁₀BCF: NA (E)</p> <p>Function in ink: Adhesion promoter</p>	<p>Structure:</p>  <p>Henry's Law: NA atm-m³/mol (E)</p>

Trimethylolpropane ethoxylate triacrylate, CAS # 28961-43-5

Chemical Properties and Information

Chemical Name: Poly(oxy-1,2-ethanediyl), .alpha.-hydro-.omega.-[(1-oxo-2-propenyl)oxy]-, ether with 2-ethyl-2-(hydroxymethyl)-1,3-propanediol (3:1)

Synonyms: Ethoxylated trimethylolpropane, triacrylate

Structure:

Molecular Formula:

Molecular Weight: >500 (E)

Melting Point: NA °C (E)

Boiling Point: >250 °C (E)

Vapor Pressure: <0.000001 mm Hg (E)

Flash Point: NA °C (M)

Water Solubility: Dispersible g/L

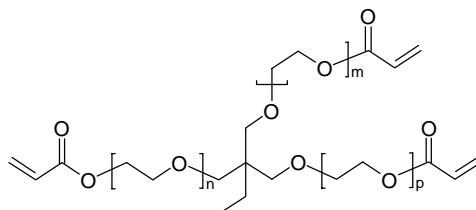
Density: 1 g/cm³ (E)

Log₁₀K_{ow}: NA (E)

Log₁₀K_{oc}: NA (E)

Log₁₀BCF: NA (E)

Function in ink: Curable resin



Henry's Law: NA atm·m³/mol (E)

Trimethylolpropane propoxylate triacrylate, CAS # 53879-54-2

Chemical Properties and Information

Chemical Name: Poly(oxy-(methyl-1,2-ethanediyl)), .alpha.-hydro-.omega.-((1-oxo-2-propenyl)oxy)-, ether with 2-ethyl-2-(hydroxymethyl)-1,3-propanediol (3:1)

Synonyms: None

Structure:

Molecular Formula: (C₃H₆O)_n(C₃H₆O)_n(C₃H₆O)_nC₁₅H₂₀O₆

Molecular Weight: >500 (E)

Melting Point: NA °C (M)

Boiling Point: >250 °C (E)

Vapor Pressure: <0.000001 mm Hg (E)

Flash Point: >110 °C (E)

Water Solubility: Dispersible g/L (E)

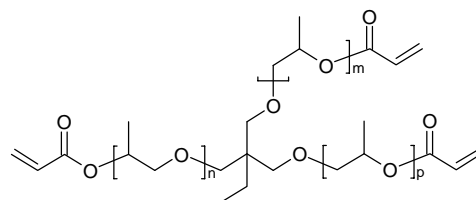
Density: 1 g/cm³ (E)

Log₁₀K_{ow}: NA (E)

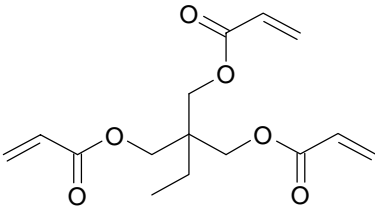
Log₁₀K_{oc}: NA (E)

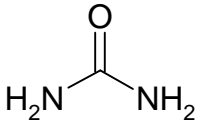
Log₁₀BCF: NA (E)

Function in ink: Curable resin



Henry's Law: NA atm·m³/mol (E)

Trimethylolpropane triacrylate, CAS # 15625-89-5	
Chemical Properties and Information	
<p>Chemical Name: 2-Propenoic acid, 2-ethyl-2-(((1-oxo-2-propenyl)oxy)methyl)-1,3-propanediol</p> <p>Synonyms: TMPT, acrylic acid, triester with 2-ethyl-2-(hydroxymethyl)-1,3-propanediol</p> <p>Molecular Formula: $C_{15}H_{20}O_6$</p> <p>Molecular Weight: 296.32</p> <p>Melting Point: 27 °C (E)</p> <p>Boiling Point: 322 °C (E)</p> <p>Vapor Pressure: 0.000563 mm Hg (E)</p> <p>Flash Point: >110 °C (E)</p> <p>Water Solubility: 0.0463 g/L (E)</p> <p>Density: 1.10 g/cm³ (M)</p> <p>Log₁₀K_{ow}: 2.863 (E)</p> <p>Log₁₀K_{oc}: 3.282 (E)</p> <p>Log₁₀BCF: 1.946 (E)</p> <p>Function in ink: Curing agent</p>	<p>Structure:</p>  <p>Henry's Law: <1E-8 atm-m³/mol (E)</p>

Urea, CAS # 57-13-6	
Chemical Properties and Information	
<p>Chemical Name: Urea</p> <p>Synonyms: Carbamide, Carbonyldiamine, Carbonyl diamide</p> <p>Molecular Formula: CH_4N_2O</p> <p>Molecular Weight: 60.06</p> <p>Melting Point: 133-135 °C (M)</p> <p>Boiling Point: 158 °C (dec) (E)</p> <p>Vapor Pressure: 0.207 mm Hg (E)</p> <p>Flash Point: °C (M)</p> <p>Water Solubility: 1000 g/L (miscible) (E)</p> <p>Density: 1.335 g/cm³ (M)</p> <p>Log₁₀K_{ow}: -2.11 (M), -1.56 (E)</p> <p>Log₁₀K_{oc}: 0.632 (E)</p> <p>Log₁₀BCF: -1.834 (E)</p> <p>Function in ink: Slip additive</p>	<p>Structure:</p>  <p>Henry's Law: <1E-8 atm-m³/mol (E)</p>

Appendix 3-B (Risk Chapter)

Human Health and Ecological Hazard Results

Table 3-B.1 Health Hazard Results for Flexographic Ink Chemicals

Chemical name and CAS number	Refer-ence*	Exposure route	Toxicity endpoints ^a	RfD/RfC	Critical toxicity value**		Comment
					Systemic	Developmental	
Chemicals for which quantitative hazard data are available.							
Ammonia 7664-41-7	1, 2	dermal	ND	ND	74 mg/kg/day - L (bone effects) ^b	ND	The LOAEL is based on a study conducted on ammonia chloride.
		inhalation	sys: corneal, liver, respiratory, and spleen effects	0.1 mg/m ³ (skin and eye irritation, respiratory effects)	ND	ND	ND
		oral	sys: decreases in bone density, bone softening	ND	74 mg/kg/day - L (bone effects)	ND	The LOAEL is based on a study conducted on ammonia chloride.
Ammonium hydroxide 1336-21-6	2	dermal	ND	ND	1.8 mg/kg/day (W), 1.2 mg/kg/day (G) - N ^c (skin and eye irritation, respiratory effects)	ND	The NOAEL is based on an inhalation NOAEL of 6.4 mg/m ³ from a study conducted on ammonia.
		inhalation	sys: eye effects, nasal irritation, respiratory effects	0.1 mg/m ³ (skin and eye irritation, respiratory effects)	ND	ND	The RfC is based on a study conducted on ammonia.
		oral	ND	ND	1.8 mg/kg/day (W), 1.2 mg/kg/day (G) - ppm (skin and eye irritation, respiratory effects)	ND	The NOAEL is based on an inhalation NOAEL of 6.4 mg/m ³ from a study conducted on ammonia.
Barium 7440-39-3	2, 3	dermal	ND	0.007 mg/kg/day (increased blood pressure) ^b	ND	18 mg/kg/day - L (increased mortality, impaired liver function) ^b	ND
		inhalation	sys: decreased body weight, reproductive and respiratory effects, increased arterial blood pressure; dev: decreased survival and weight gain, changes in hematology parameters	ND	1.15 mg/m ³ - N (decreased body weight, increased arterial blood pressure, respiratory effects)	2.2 mg/m ³ - L (reduced survival, decreased weight gain, blood effects)	ND
		oral	sys: cardiovascular, kidney and reproductive effects, increased kidney weight, decreased survival; dev: increased mortality, impaired liver function	0.007 mg/kg/day (increased blood pressure)	ND	18 mg/kg/day - L (increased mortality, impaired liver function)	ND

Chemical name and CAS number	Reference*	Exposure route	Toxicity endpoints ^a	RfD/RfC	Critical toxicity value**		Comment
					Systemic	Developmental	
2-Benzyl-2-(dimethylamino)-4'-morpholino-butyrophenone 119313-12-1	4	dermal	ND	ND	3000 mg/kg/day - L (neurotoxic effects) ^b	ND	ND
		inhalation	ND	ND	3000 mg/kg/day (10,500 mg/m ³ (W), 15,909 mg/m ³ (G)) - L (neurotoxic effects) ^b	ND	ND
		oral	sys: neurotoxic effects	ND	3000 mg/kg/day - L (neurotoxic effects)	ND	The systemic LOAEL is based upon a subacute study.
2-Butoxyethanol (glycol ether EB) 111-76-2	102-106	dermal	ND	ND	150 mg/kg/day - N	2160 mg/kg/day - N	ND
		inhalation	sys: decreased growth and hematological effects, dev: decreased maternal body, uterine, and liver weight; embryotoxicity; increased non-viable implantations; cardiac defects; skeletal malformations	ND	25 ppm (approximately 121 mg/m ³) - N	50 ppm (approximately 242 mg/m ³) -N (decreased body and uterine weight, embryotoxicity, hematological effects, skeletal malformations)	ND
		oral	sys: testicular atrophy, decreased body weight gain, increased kidney and liver weights; dev: maternal mortality, increased number of resorbed litters	ND	30 mg/kg/day - N (testicular atrophy)	1180 mg/kg/day -L (maternal mortality, increased number of resorbed litters)	ND
Butyl acetate 123-86-4	5, 6	dermal	ND	ND	60 mg/kg/day (W), 40 mg/kg/day (G) - L (serum chemistry) ^c	2031 mg/kg/day (W), 1341 mg/kg/day (G) - L (fetotoxicity and musculoskeletal abnormalities) ^c	ND
		inhalation	sys: changes in serum chemistry, fluctuations in blood pressure; dev: fetotoxicity, musculoskeletal abnormalities	ND	210 mg/m ³ - L (serum chemistry) ^d	7110 mg/m ³ - L (fetotoxicity and musculoskeletal abnormalities) ^d	ND
		oral	ND	ND	60 mg/kg/day (W), 40 mg/kg/day (G) - L (serum chemistry) ^c	2031 mg/kg/day (W), 1341 mg/kg/day (G) - L (fetotoxicity and musculoskeletal abnormalities) ^c	ND
Butyl carbitol 112-34-5	7-11	dermal	sys: blood and skin effects	ND	30 mg/kg/day - L (blood effects) ^d	2000 mg/kg/day - N ^d	ND
		inhalation	sys: liver effects	ND	2 ppm (approximately 13.3 mg/m ³) - N (liver effects) ^e	500 mg/kg/day (1750 mg/m ³ (W), 2652 mg/m ³ (G)) - N (decreased pup body weight) ^b	ND
		oral	sys: blood, kidney, liver, and reproductive effects, increased liver weight, changes in clinical chemistry; dev: decreased offspring body weight	ND	57 mg/kg/day - L (blood and clinical chemistry effects)	500 mg/kg/day - N (decreased pup body weight)	ND
C.I. Pigment Blue 15 147-14-8	12	dermal	ND	ND	6000 mg/kg/day - N ^b	ND	ND
		inhalation	ND	ND	6000 mg/kg/day (21,000 mg/m ³ (W), 31,818 mg/m ³ (G)) - N ^b	ND	ND

Table 3-B.1 Health Hazard Results for Flexographic Ink Chemicals (continued)

Chemical name and CAS number	Reference*	Exposure route	Toxicity endpoints ^a	RfD/RfC	Critical toxicity value**		Comment
					Systemic	Developmental	
		oral	ND	ND	6000 mg/kg/day - N ^f	ND	No effects were seen at the highest dose tested.
C.I. Pigment Green 7 1328-53-6	13	dermal	ND	ND	2750 mg/kg/day - L (decreased body weight) ^b	ND	Not reported to be a dermal sensitizer in guinea pigs.
		inhalation	ND	ND	2750 mg/kg/day (9625 mg/m ³ (W), 14,583 (G)) - L (decreased body weight) ^b	ND	ND
		oral	sys: decreased body weight	ND	2750 mg/kg/day - L (decreased body weight)	ND	ND
C.I. Pigment Red 23 6471-49-4	14	dermal	ND	ND	425 mg/kg/day - L (nephropathy, renal tubule hyperplasia) ^b	ND	ND
		inhalation	ND	ND	425 mg/kg/day (1488 mg/m ³ (W), 2254 mg/m ³ (G)) - L (nephropathy, renal tubule hyperplasia) ^b	ND	ND
		oral	sys: blood effects, nephropathy, renal tubule hyperplasia, forestomach epithelial hyperplasia	ND	425 mg/kg/day - L (nephropathy, renal tubule hyperplasia)	ND	ND
C.I. Pigment White 6 13463-67-7	2, 16	dermal	ND	6 mg/kg/day (premature aging) ^b	ND	ND	Not reported to be a dermal sensitizer in humans.
		inhalation	sys: respiratory effects, lung carcinogenicity (rat)	0.04 mg/m ³ (respiratory effects)	ND	ND	ND
		oral	sys: bile duct, lymphatic, and respiratory effects	6 mg/kg/day (bile duct, lymphatic, respiratory effects)	ND	ND	ND

Chemical name and CAS number	Reference*	Exposure route	Toxicity endpoints ^a	RfD/RfC	Critical toxicity value**		Comment
					Systemic	Developmental	
Citric acid 77-92-9	18	dermal	ND	ND	645 mg/kg/day - N ^b	6000 mg/kg/day - N ^b	ND
		inhalation	ND	ND	645 mg/kg/day (2258 mg/m ³ (W), 3420 mg/m ³ (G)) - N ^b	6000 mg/kg/day (21,000 mg/m ³ (W), 31,818 mg/m ³ (G)) - N ^b	ND
		oral	sys: decreased body weight gain, decreased survival	ND	645 mg/kg/day - N ^d	6000 mg/kg/day - N ^d	No effects were seen at the only doses tested in the systemic and developmental studies.
D&C Red No. 7 5281-04-9	19	dermal	ND	ND	100 mg/kg/day - L (decreased thymus weight, kidney lesions) ^b	1000 mg/kg/day - N ^b	ND
		inhalation	ND	ND	100 mg/kg/day (350 mg/m ³ (W), 530 mg/m ³ (G)) - L (decreased thymus weight, kidney lesions) ^b	1000 mg/kg/day (3500 mg/m ³ (W), 5303 mg/m ³ (G)) - N ^b	ND
		oral	sys: thymus and reproductive effects, changes in clinical chemistry, kidney effects, decreased thymus weight	ND	100 mg/kg/day - L (decreased thymus weight, kidney lesions)	1000 mg/kg/day - N ^f	No effects were seen at the highest dose tested in the developmental study.
Dicyclohexyl phthalate 84-61-7	20	dermal	ND	ND	240 mg/kg/day - N ^b	290 mg/kg/day - N ^b	ND
		inhalation	ND	ND	240 mg/kg/day (840 mg/m ³ (W), 1273 mg/m ³ (G)) - N ^b	290 mg/kg/day (1015 mg/m ³ (W), 1538 mg/m ³ (G)) - N ^b	ND
		oral	sys: increased liver weight, increased liver enzyme activity, liver effects, testicular atrophy	ND	240 mg/kg/day - N ^f	290 mg/kg/day - N ^f	No effects were seen at the highest doses tested in the systemic and developmental studies.
Diethyl sulfosuccinate, sodium salt 577-11-7	21, 22	dermal	ND	ND	ND	60 mg/kg/day - N (decreased pup body weight) ^b	Reported to be a dermal sensitizer to humans. SAT: Low to Moderate
		inhalation	ND	ND	ND	60 mg/kg/day (210 mg/m ³ (W), 318 mg/m ³ (G)) - N (decreased pup body weight) ^b	ND
		oral	sys: death, gastrointestinal and neurotoxic effects (dose unclear); dev: decreased pup body weight and weight gain	ND	ND	60 mg/kg/day - N (decreased pup body weight)	ND

Table 3-B.1 Health Hazard Results for Flexographic Ink Chemicals (continued)

Chemical name and CAS number	Reference*	Exposure route	Toxicity endpoints ^a	RfD/RfC	Critical toxicity value**		Comment
					Systemic	Developmental	
Diphenyl (2,4,6-trimethylbenzoyl) phosphine oxide 75980-60-8	23, 24	dermal	ND	ND	100 mg/kg/day - N (decreased body weight and testes size, blood effects) ^b	ND	ND
		inhalation	ND	ND	100 mg/kg/day (350 mg/m ³ (W), 530 mg/m ³ (G)) - N (decreased body weight and testes size, blood effects) ^b	ND	ND
		oral	sys: decreased body weight, increased food consumption, blood and reproductive effects, reduced testes size, scale formation	ND	100 mg/kg/day - N (decreased body weight and testes size, blood effects)	ND	ND
Dipropylene glycol methyl ether 34590-94-8	25-27	dermal	sys: neurotoxic effects	ND	5 ml/kg/day (approximately 4750 mg/kg/day) - N (neurotoxic effects) ⁹	ND	Not reported to be a dermal sensitizer in humans.
		inhalation	sys: decreased growth, liver, and neurotoxic effects, increased kidney weight	ND	200 ppm (approximately 1213 mg/m ³) - L (increased kidney weight) ⁶	ND	ND
		oral	ND	ND	1000 mg/kg/day - N ^d	ND	No effects were seen at the only dose tested.
Distillates (petroleum), hydrotreated light 64742-47-8	15	dermal	sys: skin carcinogenicity (mice)	ND	ND	ND	Oral LD ₅₀ in rats = 8532 mg/kg ^h ; dermal LD ₅₀ in rabbits > 5000 mg/kg. SAT report indicates Low to Moderate concern for skin, eye, and mucous membrane irritation, inhalation.
		oral	ND	ND	ND	ND	
Distillates (petroleum), solvent-refined light paraffinic 64741-89-5	28, 29	dermal	sys: skin effects, benign skin tumors (mice)	ND	0.05 ml 2x/week (approximately 400 mg/kg/day) - L (skin irritation) ⁱ	ND	Reported to be a dermal sensitizer in guinea pigs.
		inhalation	ND	ND	400 mg/kg/day (1400 mg/m ³ (W), 2121 mg/m ³ (G)) - L (skin irritation) ^j	ND	ND
		oral	ND	ND	400 mg/kg/day - L (skin irritation) ^j	ND	ND

Chemical name and CAS number	Reference*	Exposure route	Toxicity endpoints ^a	RfD/RfC	Critical toxicity value**		Comment
					Systemic	Developmental	
Ethanol 64-17-5	30, 31	dermal	ND	ND	8000 mg/kg/day - L (liver effects) ^b	171 mg/kg/day - N (increased spontaneous abortions) ^b	ND
		inhalation	sys: blood, liver, neurotoxic, and reproductive effects, decreased cellularity of the spleen, thymus, and bone marrow; dev: fetal malformations	ND	5653 mg/m ³ - N	30,148 mg/m ³ - N (increased incidence of malformations)	ND
		oral	sys: endocrine, gastro-intestinal, liver, reproductive, CNS, pancreatic, and rectal effects, disrupted hormone metabolism and immune response, altered left ventricular function; stomach, lymph, lung, pituitary, adrenal, pancreatic, mammary and testes carcinogenicity (mice), oral, pharyngeal, laryngeal, esophageal, rectal, and breast carcinogenicity (humans), liver carcinogenicity (mice and humans); dev: spontaneous abortions, decreased pre- and post-natal survival, increased fetal malformations, inhibited fetal growth and development, altered brain weight, retarded skeletal and muscle development and muscle growth, CNS structural defects, altered gonad growth and development, disturbances in sexual behavior and performance, hormone disruptions, decreased ovarian function, behavioral and neuromotor alterations, Fetal Alcohol Syndrome (FAS)	ND	8000 mg/kg/day - L (liver effects)	1200 mg/kg once/week (171 mg/kg/day) - N (increased spontaneous abortions) ^k	IARC (1988) has concluded that there is inadequate evidence for carcinogenicity of ethanol and of alcoholic beverages in experimental animals, but there is sufficient evidence for carcinogenicity of alcoholic beverages in humans. Ethanol is classified by IARC as a Group 1 carcinogen based on the occurrence of malignant tumors of the oral cavity, pharynx, larynx, esophagus, and liver that have been causally related to the consumption of alcoholic beverages.
Ethanolamine 141-43-5	32-35	dermal	ND	ND	500 mg/kg/day - N ^b	50 mg/kg/day - L (growth retardation, malformations) ^b	Reported to be a moderate skin sensitizer in guinea pigs.
		inhalation	sys: respiratory irritation, kidney, liver, neurotoxic, and respiratory effects	ND	5 ppm (approximately 12.5 mg/m ³) - L (skin irritation, decreased body weight, neurotoxic effects) ^e	50 mg/kg/day (175 mg/m ³ (W), 265 mg/m ³ (G)) - L (growth retardations, malformations) ^b	ND
		oral	sys: neurotoxic and reproductive effects, altered liver and kidney weights; dev: intrauterine deaths, malformations, decreased fetal weight, growth retardation	ND	500 mg/kg/day - N ^d	50 mg/kg/day - L (growth retardation, malformations)	No effects were seen at the only dose tested in the systemic study.
Ethyl acetate 141-78-6	2, 36	dermal	ND	0.9 mg/kg/day (mortality and body weight loss) ^b	ND	ND	ND

Table 3-B.1 Health Hazard Results for Flexographic Ink Chemicals (continued)

Chemical name and CAS number	Reference*	Exposure route	Toxicity endpoints ^a	RfD/RfC	Critical toxicity value**		Comment
					Systemic	Developmental	
		inhalation	sys: blood, cardiovascular, gastrointestinal, kidney, liver, neurotoxic, and respiratory effects, decreased spleen and liver weight, increased adrenal, lung, and kidney weight	ND	1261 mg/m ³ - L (degeneration of nasal mucosa)	ND	ND
		oral	sys: excess salivation, decreased food consumption, neurotoxic and respiratory effects, mortality, decreased body and organ weights	0.9 mg/kg/day (mortality and body weight loss)	ND	ND	ND
Ethyl carbitol 111-90-0	37-40	dermal	ND	ND	5 mg/kg/day - L (blood effects, increased kidney weight) ^b	6000 mg/kg/day - N	Not reported to be a dermal sensitizer in humans.
		inhalation	ND	ND	5 mg/kg/day (17.5 mg/m ³ (W), 26.5 mg/m ³ (G) - L (blood effects, increased kidney weight) ^b	1500 mg/kg/day (5250 mg/m ³ (W), 7955 mg/m ³ (G) - N (decreased motile sperm, increased liver weight, decreased brain weight in offspring) ^b	ND
		oral	sys: decreased food consumption, bladder, blood, kidney, liver, neurotoxic, reproductive and spleen effects, altered blood chemistry, increased kidney weight; dev: decreased motile sperm, increased liver weight, decreased brain weight and birth weight in offspring	ND	5 mg/kg/day - L (blood effects, increased kidney weight)	1.25% in diet (approximately 1500 mg/kg/day) - N (decreased motile sperm, increased liver weight, decreased brain weight in offspring) ¹	Length of dosing period for systemic study was not specified.

Chemical name and CAS number	Reference*	Exposure route	Toxicity endpoints ^a	RfD/RfC	Critical toxicity value**		Comment
					Systemic	Developmental	
2-Ethylhexyl diphenyl phosphate 1241-94-7	41, 42	dermal	ND	ND	136 mg/kg/day - L (increased liver weight, increased serum triglycerides) ^b	144 mg/kg/day - L (increased liver weight in pups) ^b	ND
		inhalation	ND	ND	136 mg/kg/day (476 mg/m ³ (W), 721 mg/m ³ (G)) - L (increased liver weight, increased serum triglycerides) ^b	144 mg/kg/day (504 mg/m ³ (W), 764 mg/m ³ (G)) - L (increased liver weight in pups) ^b	ND
		oral	sys: decreased body weight gain, liver, reproductive, and spleen effects, increased adrenal weight, altered liver weight, changes in serum chemistry; dev: decreased pup survival, malformations, unossified sternebrae, extra ribs, increased adrenal and liver weight, decreased spleen weight	ND	136 mg/kg/day - L (increased liver weight, increased serum triglycerides)	144 mg/kg/day - L (increased liver weight in pups)	The systemic LOAEL is based upon a subacute study.
Glycerol propoxylate triacrylate 52408-84-1	43	dermal	sys: tissue necrosis at application site, decreased body weight, neurotoxic and respiratory effects	ND	0.1 ml/animal/day (426 mg/kg/day) - L (dermal irritation and necrosis, decreased body weight gain) ^m	ND	ND
		inhalation	ND	ND	426 mg/kg/day (1491 mg/m ³ (W), 2259 mg/m ³ (G)) - L (dermal irritation and necrosis, decreased body weight gain) ^l	ND	ND
		oral	ND	ND	426 mg/kg/day - L (dermal irritation and necrosis, decreased body weight gain) ^l	ND	ND
n-Heptane 142-82-5	44, 45	dermal	ND	ND	1000 mg/kg/day - N (enzyme and gastrointestinal effects) ^b	ND	ND
		inhalation	sys: auditory and neurotoxic effects, altered serum chemistry	ND	1635 mg/m ³ - L (neurotoxic effects)	ND	ND
		oral	sys: gastrointestinal effects, altered enzyme levels, increased liver weight	ND	1000 mg/kg/day - N (enzyme and gastrointestinal effects)	ND	ND

Table 3-B.1 Health Hazard Results for Flexographic Ink Chemicals (continued)

Chemical name and CAS number	Reference*	Exposure route	Toxicity endpoints ^a	RfD/RfC	Critical toxicity value**		Comment
					Systemic	Developmental	
1,6-Hexanediol diacrylate 13048-33-4	46-48	dermal	ND	ND	ND	750 mg/kg/day - L (increased incidence of skeletal variations) ^b	Reported to be dermal sensitizer in animal studies. SAT: Moderate
		inhalation	ND	ND	ND	750 mg/kg/day (2625 mg/m ³ (W), 3977 mg/m ³ (G)) - L (increased incidence of skeletal variations) ^b	Rats exposed to 90 mg/m ³ for 6 hours exhibited no significant changes in clinical signs or gross necropsy.
		oral	dev: increase in skeletal variations	ND	N D	750 mg/kg/day - L (increased incidence of skeletal variations) ^d	ND
2-Hydroxy-2-methylpropionophenone 7473-98-5	49, 50	dermal	ND	ND	100 mg/kg/day - N (increased liver weight) ^b	ND	Reported to be a dermal sensitizer in guinea pigs.
		inhalation	ND	ND	100 mg/kg/day (350 mg/m ³ (W), 530 mg/m ³ (G)) - N (increased liver weight) ^b	ND	ND
		oral	sys: liver effects, increased liver and kidney weights	ND	100 mg/kg/day - N (increased liver weight)	ND	The systemic NOAEL is based upon a subacute study.
Hydroxypropyl acrylate 25584-83-2	51	dermal	ND	ND	7.7 mg/kg/day (W), 5.1 mg/kg/day (G) - L (respiratory lesions) ^c	ND	ND
		inhalation	sys: respiratory effects	ND	27 mg/m ³ - L (respiratory lesions)	ND	ND
		oral	ND	ND	7.7 mg/kg/day (W), 5.1 mg/kg/day (G) - L (respiratory lesions) ^c	ND	ND
Isobutanol 78-83-1	2, 52, 53	dermal	ND	0.3 mg/kg/day (neurotoxic effects) ^b	ND	ND	ND
		inhalation	sys: blood and neurotoxic effects, changes in enzyme levels; dev: cardiac septal defects	ND	0.1 mg/m ³ - N (blood effects, neurotoxic effects)	ND	ND
		oral	ND	0.3 mg/kg/day (neurotoxic effects)	ND	ND	ND

Chemical name and CAS number	Reference*	Exposure route	Toxicity endpoints ^a	RfD/RfC	Critical toxicity value**		Comment
					Systemic	Developmental	
Isopropanol 67-63-0	54-59	dermal	sys: blood and skin effects, tissue necrosis at application site, increased kidney and liver weight	ND	157 mg/kg/day - L (blood and skin effects, increased kidney and liver weight)	0.015 mg/kg/day - N (decreased embryo survival, developmental anomalies of the CNS) ^b	Reported to be a dermal sensitizer to humans. IARC (1987) has classified isopropanol as a Group 3 compound, not classifiable as to its carcinogenicity to humans based on inadequate evidence in humans and experimental animals.
		inhalation	sys: liver, neurotoxic, reproductive, respiratory, and spleen effects, changes in enzyme levels and clinical and urine chemistry; dev: fetal death, musculoskeletal abnormalities, fetotoxicity	ND	0.66 mg/m ³ - N (neurotoxic effects, enzyme, urine, blood, respiratory, liver, and spleen effects)	3500 ppm (approximately 8601 mg/m ³) - L (fetotoxicity) ^e	
		oral	sys: decreased body weight gain, kidney, liver, and reproductive effects; dev: reduced pup growth,	ND	0.015 mg/kg/day - N (liver and kidney effects)	0.015 mg/kg/day - N (decreased embryo survival, developmental)	
Kaolin 1332-58-7	60, 61	dermal	ND	ND	10,000 mg/kg/day - L (blood effects) ^b	10,000 mg/kg/day - L (decreased pup body weight) ^b	ND
		inhalation	sys: respiratory effects, increased lung weight, lung carcinogenicity (rat)	ND	3 mg/m ³ - L (lung lesions)	10,000 mg/kg/day (35,000 mg/m ³ (W), 53,030 mg/m ³ (G)) - L (decreased pup body weight) ^b	ND
		oral	sys: blood effects; dev: decreased pup body weight	ND	10,000 mg/kg/day - L (blood effects) ^d	10,000 mg/kg/day - L (decreased pup body weight) ^d	Hematology was the only non-reproductive parameter evaluated.
2-Methyl-4'-(methylthio)-2-morpholino-propiofenone 71868-10-5	62	dermal	ND	ND	75 mg/kg/day - N (neurotoxic effects, cataracts) ^b	ND	ND
		inhalation	ND	ND	75 mg/kg/day (263 mg/m ³ (W), 398 mg/m ³ (G)) - N (neurotoxic effects, cataracts) ^b	ND	ND
		oral	sys: decreased body weight and food consumption, blood, liver, and neurotoxic effects, nerve fiber degeneration, cataracts	ND	75 mg/kg/day - N (neurotoxic effects, cataracts) ^d	ND	ND
Mineral oil 8012-95-1	63	dermal	ND	ND	1676 mg/kg/day - N ^b	ND	ND
		inhalation	ND	ND	1676 mg/kg/day (5866 mg/m ³ (W), 8888 mg/m ³ (G)) - N ^b	ND	ND
		oral	sys: respiratory effects	ND	1676 mg/kg/day - N ^d	ND	No effects were seen at the only dose tested.
Phosphine oxide, bis(2,6-dimethoxy benzoyl)(2,4,4-trimethylpentyl)- 145052-34-2	64, 65	dermal	ND	ND	10 mg/kg/day - N (neurotoxic effects, increased liver weight, decreased thymus weight, squamous skin on feet) ^b	ND	Reported to be an extreme skin sensitizer in guinea pigs.

Table 3-B.1 Health Hazard Results for Flexographic Ink Chemicals (continued)

Chemical name and CAS number	Reference*	Exposure route	Toxicity endpoints ^a	RfD/RfC	Critical toxicity value**		Comment
					Systemic	Developmental	
		inhalation	ND	ND	10 mg/kg/day (35 mg/m ³ (W), 53 mg/m ³ (G)) - N (neurotoxic effects, increased liver weight, decreased thymus weight, squamous skin on feet) ^b	ND	ND
		oral	sys: neurotoxic, decreased food consumption and body weight, adrenal, blood, and liver effects, changes in enzyme levels and serum chemistry, increased liver and adrenal weight, decreased thymus weight, squamous skin on feet, tail, and scrotum	ND	10 mg/kg/day - N (neurotoxic effects, increased liver weight, decreased thymus weight, squamous skin on feet)	ND	The systemic NOAEL is based upon a subacute study.
Polyethylene glycol 25322-68-3	66, 67	dermal	ND	ND	1580 mg/kg/day - N (decreased body weight, liver and kidney lesions) ^b	ND	Not reported to be a dermal sensitizer based on studies with several materials.
		inhalation	ND	ND	1580 mg/kg/day (5530 mg/m ³ (W), 8379 mg/m ³ (G)) - N (decreased body weight, liver and kidney lesions) ^b	ND	ND
		oral	sys: decreased body weight, kidney and liver effects	ND	1580 mg/kg/day - N (decreased body weight, liver and kidney lesions)	ND	NOAEL is based upon a study with polyethylene glycol with a MW of 400.

Chemical name and CAS number	Reference*	Exposure route	Toxicity endpoints ^a	RfD/RfC	Critical toxicity value**		Comment
					Systemic	Developmental	
Polytetrafluoroethylene 9002-84-0	54, 74, 75	dermal	ND	ND	6000 mg/kg/day - N ^b	ND	Not reported to be a skin sensitizer (species not indicated).
		inhalation	sys: blood, neurotoxic, and respiratory effects, changes in urine chemistry	ND	6000 mg/kg/day (21,000 mg/m ³ (W), 31,818 mg/m ³ (G)) - N ^b	ND	IARC (1987) has classified polytetrafluoroethylene as a Group 3 compound, not classifiable as to its carcinogenicity, based on no adequate evidence in humans and inadequate evidence in experimental animals.
		oral	ND	ND	6000 mg/kg/day - N ^d	ND	The systemic NOAEL is based upon a subacute study. No effects were seen at the only dose tested.
Propanol 71-23-8	76-79	dermal	ND	ND	57.1 mg/kg/day) - L (reduced survival, liver and bone marrow effects) ^b	2458 mg/kg/day (W), 1622 mg/kg/day (G) - N (decreased fetal body weight, increased litters with malformations) ^c	ND
		inhalation	sys: liver and reproductive effects; dev: decreased fetal body weight, malformations	ND	165 mg/m ³ - L (liver lesions)	3500 ppm (approximately 8603 mg/m ³) - N (decreased fetal body weight, increased litters with malformations) ^e	The systemic LOAEL is based upon a subacute study.
		oral	sys: liver, bone marrow, and neurotoxic effects, increased liver weight, decreased survival	ND	200 mg/kg twice/week (approximately 57.1 mg/kg/day) - L (reduced survival, liver and bone marrow effects) ^k	2458 mg/kg/day (W), 1622 mg/kg/day (G) - N (decreased fetal body weight, increased litters with malformations) ^c	The U.S. EPA (1987) has proposed that propanol be given a Group C classification, possible human carcinogen, based on no evidence of carcinogenicity in humans and limited evidence of carcinogenicity in experimental animals.
Propyl acetate 109-60-4	80, 81	dermal	ND	ND	ND	ND	Dermal LD ₅₀ > 20 mL/kg (species not indicated). SAT: Low to Moderate
		inhalation	ND	ND	ND	ND	ND
		oral	ND	ND	ND	ND	Oral LD ₅₀ 's range from 6.64 to 9.37 g/kg for rats, mice, and rabbits.
Propylene glycol methyl ether 107-98-2	68-70	dermal	sys: increased mortality, blood, neurotoxic, and skin effects, altered kidney weight	0.7 mg/kg/day (liver and kidney effects, increased liver and kidney weights) ^b	ND	1580 mg/kg/day (W), 1043 mg/kg/day (G) - N (delayed ossification) ^c	Not reported to be a dermal sensitizer in guinea pigs.

Table 3-B.1 Health Hazard Results for Flexographic Ink Chemicals (continued)

Chemical name and CAS number	Reference*	Exposure route	Toxicity endpoints ^a	RfD/RfC	Critical toxicity value**		Comment
					Systemic	Developmental	
		inhalation	sys: decreased growth, liver, neurotoxic, reproductive, and respiratory effects, increased liver and kidney weights; dev: delayed ossification of vertebrae, musculoskeletal abnormalities	2 mg/m ³ (neurotoxic effects)	ND	1500 ppm (approximately 5530 mg/m ³) - N (delayed ossification) ^e	ND
		oral	sys: decreased body weight and body weight gain, decreased food consumption, blood, neurotoxic, kidney, liver, and reproductive effects, and increased liver and kidney weight, spermiophages in the epididymus	0.7 mg/kg/day (liver and kidney effects, increased liver and kidney weights)	ND	1580 mg/kg/day (W), 1043 mg/kg/day (G) - N (delayed ossification) ^c	ND
Propylene glycol propyl ether 1569-01-3	71-73	dermal	ND	ND	41 mg/kg/day (W), 27 mg/kg/day (G) - N ^c	1034 mg/kg/day (W), 683 mg/kg/day (G) - N (poorly ossified hind-limb phalanges) ^c	ND
		inhalation	sys: decreased body weight and body weight gain, corneal opacity and injury, neurotoxic effects, increased kidney and liver weight; dev: poorly ossified hind-limb phalanges	ND	145 mg/m ³ - N	3620 mg/m ³ - N (poorly ossified hind-limb phalanges)	483 mg/m ³ caused irreversible eye lesions in F344 rats, and potentially reversible eye lesions in SD rats and rabbits.
		oral	ND	ND	41 mg/kg/day (W), 27 mg/kg/day (G) - N ^c	1034 mg/kg/day (W), 683 mg/kg/day (G) - N (poorly ossified hind-limb phalanges) ^c	ND
Resin, acrylic NK	82-85	dermal	ND	ND	1500 mg/kg/day - N ^f	4000 mg/kg/day - N ^b	NOAELs and toxicity endpoints are based on studies conducted on acrylic acid homopolymer, CAS# 9003-01-4.
		inhalation	sys: respiratory effects, lung carcinogenicity (rats)	ND	0.05 mg/m ³ - N (respiratory effects)	10 mg/m ³ - N ^f	
		oral	sys: decreased body weight gain, kidney effects, changes in urine chemistry	ND	3000 mg/kg/day - N ^f	4000 mg/kg/day - N ^f	

Chemical name and CAS number	Reference*	Exposure route	Toxicity endpoints ^a	RfD/RfC	Critical toxicity value**		Comment
					Systemic	Developmental	
Silica 7631-86-9	86, 101	dermal	ND	ND	ND	ND	Dose was not extrapolated from inhalation to oral or dermal because treatment-related effects were confined to the lungs. IARC (1997) has classified crystalline silica as a Group 1 compound, carcinogenic to humans, based on sufficient evidence in humans and experimental animals. IARC has classified amorphous silica as a Group 3 compound, not classifiable as to its carcinogenicity to humans, based on inadequate evidence in humans and experimental animals.
		inhalation	sys: death, lymphatic and respiratory effects, lung carcinogenicity (rats and humans)	ND	0.1 mg/m ³ crystalline silica - N (silicosis)	ND	
		oral	ND	ND	ND	ND	
Silicone oil 63148-62-9	87-90	dermal	sys: decreased testes weight and size, spermatogenic depression, tubular atrophy; dev: increased resorptions, malformations	ND	200 mg/kg/day - L (death, decreased testes weight, spermatogenic depression)	200 mg/kg/day - L (increased incidence of resorptions)	ND
		inhalation	ND	ND	200 mg/kg/day (700 mg/m ³ (W)), 1061 mg/m ³ (G)) - N ^b	200 mg/kg/day (700 mg/m ³ (W), 1061 mg/m ³ (G)) - L (increased incidence of resorptions) ^j	Exposure of rats, dogs, and guinea pigs to 2,120 mg/m ³ for 6 hours resulted in neurotoxic and respiratory effects.
		oral	sys: increased food consumption, gastrointestinal effects, increased spleen weight, decreased seminal vesicle weight	ND	1% in the diet (approximately 200 mg/kg/day) - N ⁱ	200 mg/kg/day - L (increased incidence of resorptions) ^j	ND
Styrene 100-42-5	2, 91, 92	dermal	ND	0.2 mg/kg/day (blood effects) ^b	ND	300 mg/kg/day - N ^b	ND
		inhalation	sys: nasal and lung irritation, blood, liver, neurotoxic, and respiratory effects, increased liver weight, mammary carcinogenicity (rats); dev: increased resorptions, fetal deaths, decreased pup body weight, decreased levels of fetal cerebral serotonin and S-hydroxyindoleacetic acid	1.0 mg/m ³ (neurotoxic effects in humans)	ND	50 ppm (approximately 213 mg/m ³) - L (decreased pup body weight) ^e	ND
		oral	sys: blood, liver, neurotoxic, and respiratory effects, lung and liver carcinogenicity (mice)	0.2 mg/kg/day (blood effects)	ND	300 mg/kg/day - N	ND

Table 3-B.1 Health Hazard Results for Flexographic Ink Chemicals (continued)

Chemical name and CAS number	Reference*	Exposure route	Toxicity endpoints ^a	RfD/RfC	Critical toxicity value**		Comment
					Systemic	Developmental	
Trimethylol-propane ethoxylate triacrylate 28961-43-5	93	dermal	ND	ND	ND	1000 mg/kg/day - N ^b	SAT: Low to Moderate
		inhalation	sys: liver and spleen effects; dose unclear	ND	ND	1000 mg/kg/day (3500 mg/m ³ (W), 5303 mg/m ³ (G)) - N ^b	ND
		oral	ND	ND	ND	1000 mg/kg/day - N ^d	No effects were seen at the only dose tested.
Trimethylol-propane triacrylate 15625-89-5	94-97	dermal	sys: decreased body weight, skin and neurotoxic effects, changes in clinical chemistry, altered organ weights	ND	0.75 mg/kg/day - N (dermal lesions)	500 mg/kg/day - N ^b	Reported to be a mild dermal sensitizer in guinea pigs.
		inhalation	sys: decreased body weight, respiratory effects	ND	5.7 mg/m ³ - L (respiratory effects, body weight loss)	500 mg/kg/day (1750 mg/m ³ (W), 2652 mg/m ³ (G)) - N ^b	ND
		oral	ND	ND	1.6 mg/kg/day (W), 1.1 mg/kg/day (G) - L (respiratory effects, body weight loss) ^c	500 mg/kg/day - N	ND
Urea 57-13-6	98-100	dermal	ND	ND	6750 mg/kg/day - N ^b	50,000 mg/kg/day - N ^b	Not reported to be a dermal sensitizer (species not indicated).
		inhalation	ND	ND	6750 mg/kg/day (23,625 mg/m ³ (W), 35,795 mg/m ³ (G)) - N ^b	50,000 mg/kg/day (175,000 mg/m ³ (W), 265,152 mg/m ³ (G)) - N ^b	ND
		oral	ND	ND	6750 mg/kg/day - N	50,000 mg/kg/day - N	No effects were seen at any doses tested in the systemic and developmental studies.

ABBREVIATIONS: NK, not known; CTV, critical toxicity value; N, NOAEL or NOAEC; L, LOAEL or LOAEC; sys, systemic effects; dev, developmental effects; W, worker; G, general population

*Most of the references were developed from online database searches conducted during July and August 1997. In most cases, the primary references were not reviewed.

**The critical toxicity value (CTV) is the NOAEL, NOAEC, LOAEL, or LOAEC. The CTV is used with exposure data for quantitative evaluation of risk.

^a Provides a complete listing for all endpoints/toxic effects found within the hazard profiles. Does not indicate severity of effects.

^b Inhalation or dermal CTV or RfD is based on oral data. Worker inhalation values (W) have been converted from mg/kg/day to mg/m³ using the following conversion, based upon default human body weight (70 kg) and respiratory rate (20 m³/day):

$$\text{mg/m}^3 = \text{mg/kg/day} \times 1 \text{ day}/20 \text{ m}^3 \times 70 \text{ kg}$$

General population inhalation values (G) have been converted from mg/kg/day using the following conversions, based upon default human body weight (70 kg) and respiratory rate (13.2 m³/day):

$$\text{mg/m}^3 = \text{mg/kg/day} \times 1 \text{ day}/13.2 \text{ m}^3 \times 70 \text{ kg}$$

^c Oral or dermal CTV is based upon inhalation data. Worker oral or dermal values (W) have been converted from mg/m³ to mg/kg/day using the following conversion, based upon default human body weight (70 kg) and respiratory rate (20 m³/day):

$$\text{mg/kg/day} = \text{mg/m}^3 \times 20 \text{ m}^3/1 \text{ day} \times 1/70 \text{ kg}$$

General population oral or dermal values (G) have been converted from mg/m³ to mg/kg/day using the following conversion, based upon default human body weight (70 kg) and respiratory rate (13.2 m³/day):

$$\text{mg/kg/day} = \text{mg/m}^3 \times 13.2 \text{ m}^3/1 \text{ day} \times 1/70 \text{ kg}$$

^d Only dose tested.

^e Original data given in ppm, converted to mg/m³ using the following conversion:

$$\text{mg/m}^3 = [\text{ppm} \times \text{molecular weight (grams)}] \div 24.45$$

^f Highest dose tested

^g Original dose was given in ml/kg/day and was converted to mg/kg/day using the following conversion:

$$\text{mg/kg/day} = \text{ml/kg/day} \times \text{density (grams/ml)} \times 1000 \text{ mg/gram}$$

^h Available LD₅₀s given only for those chemicals for which no other toxicity information was found.

ⁱ Original value for petroleum distillates was given as 0.05 ml 2x/week and has been converted to mg/kg/day using the following conversion, using a default mouse body weight of 25 grams, a dose of 0.01 ml/day, and assuming a density of 1 gram/ml:

$$\text{mg/kg/day} = 0.01 \text{ ml} / .025 \text{ kg} \times 1/\text{day} \times 1 \text{ gram/ml} \times 1000 \text{ mg/gram} = 400 \text{ mg/kg/day}$$

^j Oral or inhalation CTV or RfD is based upon dermal data. Worker inhalation values (W) have been converted from mg/kg/day to mg/m³ using the following conversion, based upon default human body weight (70 kg) and respiratory rate (20 m³/day):

$$\text{mg/m}^3 = \text{mg/kg/day} \times 1 \text{ day} / 20 \text{ m}^3 \times 70 \text{ kg}$$

General population inhalation values (G) have been converted from mg/kg/day to mg/m³ using the following conversion, based upon default human body weight (70 kg) and respiratory rate (13.2 m³/day):

$$\text{mg/m}^3 = \text{mg/kg/day} \times 1 \text{ day} / 13.2 \text{ m}^3 \times 70 \text{ kg}$$

^k Original dose was given as 1x or 2x/week and has been converted to mg/kg/day by dividing the total weekly dose by 7 days/week.

^l Original exposure was given as % in diet. For studies with humans, conversions were done by the performing laboratory. For mice, values were converted using a default body weight of 25 grams and average food intake of 3 grams/day:

$$\text{mg/kg/day} = \% \text{ in diet} / 100 \times 3 \text{ grams/day} \div 0.025 \text{ kg} \times 1000 \text{ mg/gram}$$

^m Original value was given as ml/animal/day and has been converted to mg/kg/day using the following conversion, based upon default rat body weight (250 g) and density of 1.064 grams/ml:

$$\text{mg/kg/day} = 0.1 \text{ ml} / .25 \text{ kg} \times 1/\text{day} \times 1.064 \text{ grams/ml} \times 1000 \text{ mg/gram}$$

Table 3-B.2 SAT Reports and Available Acute Data for Chemicals with No or Inadequate Toxicity Data

Chemical name and CAS number	Summary of SAT report and available acute data	Reference
SAT reports^a for chemicals with no or inadequate toxicity data.		
Acrylated epoxy polymer NK	Low to Moderate concern for lung effects if respirable particles of high molecular weight species (>10,000) are inhaled. If the polymer is terminated with acrylates, there is concern for mutagenicity, oncogenicity, developmental toxicity, and dermal and respiratory sensitization.	
Acrylated oligoamine polymer NK	Low to Moderate concern for lung effects if respirable particles of high molecular weight species (>10,000) are inhaled. If the polymer is terminated with acrylates, there is concern for mutagenicity, oncogenicity, developmental toxicity, and dermal and respiratory sensitization.	
Acrylated polyester polymer #1 NK	Low to Moderate concern for lung effects if respirable particles of high molecular weight species (>10,000) are inhaled. If the polymer is terminated with acrylates, there is concern for mutagenicity, oncogenicity, developmental toxicity, and dermal and respiratory sensitization.	
Acrylated polyester polymer #2 NK	Low to Moderate concern for lung effects if respirable particles of high molecular weight species (>10,000) are inhaled. If the polymer is terminated with acrylates, there is concern for mutagenicity, oncogenicity, developmental toxicity, and dermal and respiratory sensitization.	
Acrylic acid-butyl acrylate-methyl methacrylate-styrene polymer 27306-39-4	Low to Moderate concern for lung effects if respirable particles of high molecular weight species (>10,000) are inhaled.	
Acrylic acid polymer, acidic #1 NK	Low to Moderate concern for lung effects if respirable particles of high molecular weight species (>10,000) are inhaled.	
Acrylic acid polymer, acidic #2 NK	Low to Moderate concern for lung effects if respirable particles of high molecular weight species (>10,000) are inhaled.	
Acrylic acid polymer, insoluble NK	Low to Moderate concern for lung effects if respirable particles of high molecular weight species (>10,000) are inhaled.	
Alcohols, C11-C15-secondary, ethoxylated 68131-40-8	Moderate concern overall. This material is reported to be a severe skin irritant. The surfactant activity of this chemical may result in eye irritation and lung effects.	
Amides, tallow, hydrogenated 61790-31-6	Low concern overall.	
Butyl acrylate-methacrylic acid-methyl methacrylate polymer 25035-69-2	Low to Moderate concern for lung effects if respirable particles of high molecular weight species (>10,000) are inhaled.	
C.I. Basic Violet 1, molybdatephosphate 67989-22-4	Low to Moderate concern for oncogenicity, mutagenicity, and developmental toxicity.	
C.I. Basic Violet 1, molybdate tungstate-phosphate 1325-82-2	Low to Moderate concern for oncogenicity, genotoxicity, developmental toxicity, immunosuppression, methemoglobinemia, and liver effects.	
C.I. Pigment Blue 61 1324-76-1	Low concern overall.	
C.I. Pigment Red 48, barium salt (1:1) 7585-41-3	4 hour LC ₅₀ in rats = 5420 mg/m ^{3h} . Low to Moderate concern for oncogenicity, neurotoxicity and developmental toxicity.	15
C.I. Pigment Red 48, calcium salt (1:1) 7023-61-2	Low to Moderate concern for oncogenicity.	
C.I. Pigment Red 52, calcium salt (1:1) 17852-99-2	Low to Moderate concern for mutagenicity, developmental toxicity, and oncogenicity.	

Chemical name and CAS number	Summary of SAT report and available acute data	Reference
C.I. Pigment Red 269 67990-05-0	Low concern overall.	
C.I. Pigment Violet 23 6358-30-1	Low concern overall.	
C.I. Pigment Violet 27 12237-62-6	Low to Moderate concern for oncogenicity, mutagenicity, developmental toxicity, and neurotoxicity.	
C.I. Pigment White 7 1314-98-3	Low to Moderate concern for mutagenicity, developmental toxicity, and immunotoxicity.	
C.I. Pigment Yellow 14 5468-75-7	No clinical signs of toxicity were seen in rats exposed orally to 11,000 mg/kg. Low concern overall unless exposed to temperatures greater than 200C. There is Low to Moderate concern for oncogenicity, mutagenicity, neurotoxicity, and liver effects.	17
C.I. Pigment Yellow 74 6358-31-2	Low concern overall.	
Dipropylene glycol diacrylate 57472-68-1	Oral LD ₅₀ in rats = 4.6 g/kg. Moderate concern for genotoxicity, neurotoxicity, oncogenicity, developmental and reproductive effects, dermal and respiratory sensitization, and skin and eye irritation.	
Erucamide 112-84-5	Low concern overall.	
Ethoxylated tetramethyldecyldiol 9014-85-1	Low to Moderate concern for eye, skin, lung and mucous membrane irritation, and neurotoxic, liver, and kidney effects. The surfactant nature of this material may cause lung effects if inhaled.	
Ethyl 4-dimethyl-aminobenzoate 10287-53-3	Low to Moderate concern for genotoxicity, oncogenicity, neurotoxicity, cardiac sensitization, and developmental toxicity.	
Fatty acid, dimer-based polyamide NK	Low concern overall.	
Fatty acids, C18-unsatd., dimers, polymers with ethylenediamine, hexamethylenediamine, and propionic acid 67989-30-4	Low concern overall.	
1-Hydroxycyclohexyl phenyl ketone 947-19-3	Low concern overall.	
Hydroxylamine derivative NK	Moderate concern for genotoxicity, dermal sensitization, and developmental toxicity.	

Table 3-B.2 SAT Reports and Available Acute Data for Chemicals with No or Inadequate Toxicity Data (continued)

Chemical name and CAS number	Summary of SAT report and available acute data	Reference
Isopropoxyethoxytitanium bis(acetylacetonate) 68586-02-7	Moderate concern for neurotoxicity, genotoxicity, oncogenicity, and developmental/reproductive toxicity. This material is expected to be reactive, which may result in irritation of the eyes, skin, and mucous membranes.	
2-Isopropylthioxanthone 5495-84-1	Low concern overall.	
4-Isopropylthioxanthone 83846-86-0	Low concern overall.	
2-Methoxy-1-propanol	Low to Moderate concern for developmental toxicity, neurotoxicity, and immunosuppression.	
Methylenedisalicylic acid 27496-82-8	Low to Moderate concern for effects on blood clotting, sensitization, immunosuppression, irritation of mucous membranes, developmental toxicity, endocrine disruption, and genotoxicity.	
Nitrocellulose 9004-70-0	Oral LD ₅₀ in rats and mice > 5 grams/kg. Low to Moderate concern for lung effects if respirable particles of high molecular weight species (>10,000) are inhaled.	15
Paraffin wax 8002-74-2	Low to Moderate concern for respiratory effects.	
Polyethylene 9002-88-4	IARC (1987) has classified polyethylene as a Group 3 compound, not classifiable as to its carcinogenicity to humans, based on no adequate evidence in humans and inadequate evidence in experimental animals. Low to Moderate concern for lung effects if respirable particles of high molecular weight species (>10,000) are inhaled.	57
Polyol derivative A —	Low concern overall.	
Resin acids, hydrogenated, methyl esters 8050-15-5	Low concern overall. There is uncertain concern for respiratory sensitization.	
Rosin, fumarated, polymer with diethylene glycol and pentaerythritol 68152-50-1	Low concern overall unless respirable particles of high molecular weight species (>10,000) are inhaled. There is uncertain concern for respiratory sensitization.	
Rosin, fumarated NK	Low concern overall.	
Rosin, polymerized 65997-05-9	Low to Moderate concern for lung effects if respirable particles of high molecular weight species (>10,000) are inhaled. There is uncertain concern for respiratory sensitization.	
Silanamine, 1,1,1-trimethyl-N-(trimethyl-silyl)-, hydrolysis products with silica 68909-20-6	Low to Moderate concern for lung effects (silicosis) if crystalline material is inhaled.	
Siloxanes and silicones, di-Me, 3-hydroxypropyl Me, ethers with polyethylene glycol acetate 70914-12-4	Low to Moderate concern for lung effects if respirable particles of high molecular weight species (>10,000) are inhaled.	
Solvent naphtha (petroleum), light aliphatic 64742-89-8	Low to Moderate concern for neurotoxicity and lung irritation. The material may also cause defatting of the skin through prolonged exposure.	

Chemical name and CAS number	Summary of SAT report and available acute data	Reference
Styrene acrylic acid polymer #1 NK	Low to Moderate concern for lung effects if respirable particles of high molecular weight species (>10,000) are inhaled.	
Styrene acrylic acid polymer #2 NK	Low to Moderate concern for lung effects if respirable particles of high molecular weight species (>10,000) are inhaled.	
Styrene acrylic acid resin NK	Low to Moderate concern for lung effects if respirable particles of high molecular weight species (>10,000) are inhaled.	
Tetramethyldecyldiol 126-86-3	Low concern for eye, skin, lung, and mucous membrane irritation, and neurotoxic, liver, and kidney effects.	
Thioxanthone derivative NK	Low to Moderate concern for neurotoxicity.	
Titanium diisopropoxide bis(2,4-pentanedionate) 17927-72-9	This material is expected to be reactive, which may result in irritation of the eyes, skin, and mucous membranes. Moderate concern based on release of hydrolysis products: 2,4 pentanedione, inorganic titanium, and isopropanol. 2,4 pentanedione: concern for neurotoxicity, mutagenicity, oncogenicity, and developmental/reproductive toxicity. Inorganic titanium: concern for mutagenicity and oncogenicity. Isopropanol: concern for liver, neurotoxic, reproductive, respiratory, and spleen effects; changes in enzyme levels and clinical and urine chemistry; fetal death, musculoskeletal abnormalities, fetotoxicity, blood and skin effects, tissue necrosis at application site, increased kidney and liver weight.	
Titanium isopropoxide 546-68-9	This material is expected to be reactive, which results in moderate concern for irritation of the eyes, skin, and mucous membranes. Moderate concern based on release of the hydrolysis products, inorganic titanium and isopropanol. Inorganic titanium: concern for mutagenicity and oncogenicity. Isopropanol: concern for liver, neurotoxic, reproductive, respiratory, and spleen effects; changes in enzyme levels and clinical and urine chemistry; fetal death, musculoskeletal abnormalities, fetotoxicity, blood and skin effects, tissue necrosis at application site, increased kidney and liver weight.	
Trimethylolpropane propoxylate triacrylate 53879-54-2	Low to Moderate concern for oncogenicity, mutagenicity, developmental and reproductive effects, sensitization, and irritation.	

^a SAT reports are generated by the OPPT Structure-Activity Team to predict toxicity based on analog data and/or structure-activity considerations.

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ENVIRONMENTAL HAZARD ASSESSMENT METHODOLOGY

Hazard Profile

The environmental hazard assessment of chemicals consists of the identification of the effects that a chemical may have on organisms in the environment. An overview of this assessment process has been reported, for example, by Smrcek and Zeeman (1998)¹ and by Zeeman and Gilford (1993a)². The effects are expressed in terms of the acute and chronic toxicity of a chemical on the exposed organisms. There are generally given as either the lethal concentration (LC) or as the effective concentration (EC), which describe the type and seriousness of the effect for a known concentration of a chemical. When the effective concentrations for a range of species for a chemical are tabulated, the tabulation is called a Hazard Profile or Toxicity Profile. A more detailed discussion of a comprehensive Hazard Profile has been presented by Nabholz, 1991.³ The most frequently used Hazard Profile for the aquatic environment consists of a set of six effective concentrations as reported by Nabholz, et al., (1993a).⁴ These are:

- Fish acute value (usually a fish 96-hour LC₅₀ value)
- Aquatic invertebrate acute value (usually a daphnid 48-hour LC₅₀ value)
- Green algal toxicity value (usually an algal 96-hour EC₅₀ value)
- Fish chronic value [usually a fish 28-day chronic value (ChV)]
- Aquatic invertebrate chronic value (usually a daphnid 21-day ChV)
- Algal chronic value [usually an algal 96-hour no effect concentration (NEC) or geometric mean maximum acceptable toxicant concentration (GMATC) value for biomass]

For the acute values, the LC₅₀ (lethality or mortality) or EC₅₀ (non-lethal effects) refers to the concentration that results in 50 percent of the test organisms affected at the end of the specified exposure period in a toxicity test. The chronic values represent the concentration of the chemical that results in no statistically significant sublethal effects on the test organism following an extended or chronic exposure.

The Hazard Profile can be constructed using effective concentrations based on toxicity test data (with measured test chemical concentrations) or estimated toxicity values based on Structure Activity Relationships (SARs). The measured values are preferred because they are based on actual test data, but SAR estimates, if available for the chemical class, can be used in the absence of test data. Thus the Hazard Profile may consist of only measured data, only predicted values, or a combination of both. Also, the amount of data in the hazard profile may range from a minimum of one acute or chronic value to the full compliment of three acute values and three chronic values.

In the absence of measured toxicity values, estimates of these values can be made using Structure Activity Relationships (SARs). SAR methods include Quantitative Structure Activity Relationships (QSARs), qualitative SARs or the use of the chemical analogs. The use of SARs by OPPT has been described in other texts.⁵ The use and application of QSARs

specifically for the hazard assessment of new TSCA chemicals has been presented in other information sources as well.⁶ The development, validation and application of SARs in OPPT have been presented by OPPT staff.^{7,8,9,10,11,12}

The predictive equations (QSARs) are used in lieu of actual test data to estimate a toxicity value for aquatic organisms within a specific chemical class. The chemical classes and subclasses with available QSARs, numbering a total of 140, have been listed.^{13,14} Although the equations are derived from correlation and linear regression analysis based on measured data, the confidence intervals associated with the equation are not used to provide a range of toxicity values. Even with measured test data, the use of the confidence limits to determine the range of values is not used.

Determination of Concern Concentration

Upon completion of a hazard profile, a concern concentration (CC) is determined. A concern concentration is that concentration of a chemical in the aquatic environment which, if exceeded, may cause a significant risk to aquatic organisms. Conversely, if the CC is not exceeded, the assumption is made that probability of a significant risk occurring is low and no regulatory action is required. The CC for each chemical is determined by applying Assessment Factors (AsF)¹⁵ or Uncertainty Factors (UF)¹⁶ to the effect concentrations in the hazard profile.

These factors incorporate the concept of the uncertainty associated with (1) toxicity data; laboratory tests versus field test and measured versus estimated data and (2) species sensitivity. For example, if only a single LC₅₀ value for a single species, is available, there are several uncertainties to consider. First, how reliable is the value itself? If the test were to be done again by the same laboratory or a different laboratory, would the value differ, and if so, by how much? Second, there are differences in sensitivity (toxicity) among and between species that have to be considered. Is the species tested the most or the least sensitive? In general, if only a single toxicity value is available, there is a large uncertainty about the applicability of this value to other organisms in the environment and large assessment factor, i.e., 1000, is applied to cover the breadth of sensitivity known to exist among and between organisms in the environment. Conversely, the more information that is available results in more certainty concerning the toxicity values and requires the use of smaller factors. For example, if toxicity values are derived from field tests, then an assessment factor on 1 is used, because these tools measure chemical effects on field organisms.

Four factors are used by OPPT to set a CC for chronic risk: 1, 10, 100, and 1000. The factor used is dependent on the amount and type of toxicity data contained in the hazard profile and reflects the amount of uncertainty about the potential effects associated with a toxicity value. In general, the more complete the hazard profile and the higher the quality of the generated toxicity data, the smaller the factor that is used. The following discussion describes the use and application of the uncertainty or assessment factors:

- If the hazard profile only contains one or two acute toxicity values, the concern concentration is set at 1/1000 of the acute value.
- If the hazard profile contains three acute values (called the base set), the concern concentration is set at 1/100 of the lowest acute value.
- If the hazard profile contains one chronic value, the concern concentration is set at 1/10 of the chronic value if the value is for the most sensitive species. Otherwise, it

is 1/100 of the acute value for the most sensitive species.

- If the hazard profile contains three chronic values, the concern concentration is set at 1/10 of the lowest chronic value.
- If the hazard profile contains a measured chronic value from a field study, then an assessment factor of 1 is used.

Hazard Ranking

Chemicals can be also be ranked by their hazard concern levels for the aquatic environment. This ranking can be based upon the acute toxicity values expressed in milligrams per liter (mg/L). The generally accepted scoring used by OPPT is as follows:^{17,18}

High Concern (H)	≤ 1
Moderate (or Medium) Concern (M)	$> 1 \text{ and } \leq 100$
Low Concern (L)	> 100

This ranking can also be expressed in terms of chronic values as follows:

High Concern (H)	≤ 0.1
Moderate (or Medium) Concern (M)	$> 0.1 \text{ and } \leq 10.0$
Low Concern (L)	> 10.0

Chronic toxicity ranking takes precedent over the acute ranking.

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Table 3-B.3 Estimated Lowest Aquatic Toxicity Values of Flexographic Ink Chemicals Based on SAR Analysis or on Actual Measured Test Data

Chemical	Acute toxicity (mg/L)			Chronic toxicity (mg/L)			Concern concentration
	Fish	Invert.	Algal	Fish	Invert.	Algal	
Acrylated epoxy polymer	a						
Acrylated oligoamine polymer	a						
Acrylated polyester polymer #1	a						
Acrylated polyester polymer #2	a						
Acrylic acid-butyl acrylate-methyl methacrylate-styrene polymer	a						
Acrylic acid polymer, acidic #1	≥ 300	≥ 400	9	≥ 30	≥ 40	1	>1
Acrylic acid polymer, acidic #2	≥ 300	≥ 400	9	≥ 30	≥ 40	1	>1
Acrylic acid polymer, insoluble	a						
Alcohols, C11-15-secondary, ethoxylated	1	1	1	0.2	0.2	0.3	0.02
Amides, tallow, hydrogenated	b	b	b	0.002	0.005	0.01	0.001
Ammonia fresh water	0.93	1.91	2.4	0.07	0.6	0.6	0.01-0.006

Table 3-B.3 Estimated Lowest Aquatic Toxicity Values of Flexographic Ink Chemicals Based on SAR Analysis or on Actual Measured Test Data (continued)

Chemical	Acute toxicity (mg/L)			Chronic toxicity (mg/L)			Concern concentration
	Fish	Invert.	Algal	Fish	Invert.	Algal	
D&C Red No. 7	29	37	20	>3	2.6	2	0.2-0.3
Dicyclohexyl phthalate	b	b	0.05	0.03	0.03	0.04	0.003
Diethyl sulfosuccinate, sodium salt	3	3	30	0.5	.05	3	0.05
Diphenyl (2,4,6-trimethylbenzoyl) phosphine oxide	3	5.2	0.43	0.4	0.61	0.35	0.04
Dipropylene glycol diacrylate	3.8	26	2.7	0.25	3	6	0.03
Dipropylene glycol methyl ether	5000	4600	2600	500	110	95	10
Distillates (petroleum), hydrotreated light	0.23	0.3	0.22	0.05	0.05	0.1	0.005
Distillates (petroleum), solvent-refined light paraffinic	a						
Erucamide	a						
Ethanol	4300	4000	6100	390	76	60	6
Ethanolamine	1035	100	63	200	10	0.85	0.09
Ethoxylated tetramethyldecynidiol	>50	>50	>50	>10	>10	>10	1
Ethyl acetate	66	>1000	5	7	>100	3.7	0.4
Ethyl carbitol	>1000	>1000	>1000	900	190	150	20
Ethyl 4-dimethylaminobenzoate	13	15	10	2	1.3	1.9	0.1
2-Ethylhexyl diphenyl phosphate	b	b	0.05	0.03	0.03	0.04	0.003
Fatty acid, dimer-based polyamide	a						
Fatty acids, C18-unsatd., dimers, polymers with ethylenediamine, hexamethylenediamine, and propionic acid	a						
Glycerol propoxylate triacrylate	≤4.5	≤14	≤1.6	≤0.13	≤0.1	≤0.4	0.01
n-Heptane	0.41	0.52	0.37	0.08	0.08	0.15	0.008
1,6-Hexanediol diacrylate	2.4	7.6	0.82	0.2	0.8	0.07	0.007
1-Hydroxycyclohexyl phenyl ketone	33	37	24	4.8	2.6	3.6	0.3
Hydroxylamine derivative	≤54	≤3.9	≤6.8	≤5	≤0.4	≤1.4	0.04
2-Hydroxy-2-methylpropiophenone	450	460	280	52	18	20	2
Hydroxypropyl acrylate	4.9	160	15	1.7	20	4	0.2
Isobutanol	930	910	530	97	26	25	2.5
Isopropanol	2700	2600	1400	260	57	48	5
Isopropoxyethoxytitanium bis(acetylacetonate)	13	15	10	2	1.4	2.3	0.1, ≥ 1.0 ^c
2-Isopropylthioxanthone	b	b	b	0.004	0.004	0.004	0.001
4-Isopropylthioxanthone	b	b	b	0.03 or ^a	0.03 or ^a	0.03 or ^a	0.003
Kaolin	>1000	>1000	>1000	>100	50	>100	5.0
Methylenedisalicylic acid	>100	>100	30	>10	>10	3	0.3
2-Methyl-4'(methylthio)-2-morpholinopropiophenone	45	51	33	6.6	3.6	5	0.4
Mineral oil	b	b	b	0.002 or ^a	0.004 or ^a	0.010 or ^a	0.001
Nitrocellulose	>100	>100	>100	>10	>10	>10	1
Paraffin wax	a						
Phosphine oxide, bis(2,6-dimethoxybenzoyl) (2,4,4-trimethylpentyl)-	5.1 or ^a	5.1 or ^a	0.78 or ^a	0.9 or ^a	1.2 or ^a	0.62 or ^a	0.06
Polyethylene glycol	>100	>100	>100	>10	>10	>10	1

Table 3-B.3 Estimated Lowest Aquatic Toxicity Values of Flexographic Ink Chemicals Based on SAR Analysis or on Actual Measured Test Data (continued)

Chemical	Acute toxicity (mg/L)			Chronic toxicity (mg/L)			Concern concentration
	Fish	Invert.	Algal	Fish	Invert.	Algal	
Polyol derivative A	>1000	>1000	>1000	>100	>100	>100	10
Polytetrafluoroethylene	a						
Propanol	1800	1700	970	180	42	36	4
Propyl acetate	41	430	3.2	4	16	2.4	0.2
Propylene glycol methyl ether	>1000	>1000	>1000	>1000	210	160	20
Propylene glycol propyl ether	≥ 1000	≥ 1000	≥ 980	≥ 180	≥ 47	≥ 44	4
Resin acids, hydrogenated, methyl esters	b	b	b	0.001 or ^a	0.001 or ^a	0.005 or ^a	0.001
Resin, acrylic	≥ 300	≥ 400	9	≥ 30	≥ 40	1	>1
Rosin, fumarated, polymer with diethylene glycol and pentaerythritol	a						
Rosin, fumarated, polymer with pentaerythritol, 2-propenoic acid, ethenylbenzene, and (1-methylethylenyl)benzene	a						
Rosin, polymerized	a						
Silamine, 1,1,1-trimethyl-N-(trimethylsilyl)-, hydrolysis products with silica	>100 or ^a	>100 or ^a	>100 or ^a	>10 or ^a	>10 or ^a	>10 or ^a	>1 or ^a
Silica	a						
Silicone oil	>100 or ^a	>100 or ^a	>100 or ^a	>10 or ^a	>10 or ^a	>10 or ^a	1.0 or ^a
Siloxanes and silicones, di-Me, 3-hydroxypropyl Me, ethers with polyethylene glycol acetate	>100	>100	>100	>10	>10	>10	>1
Solvent naphtha (petroleum), light aliphatic	1.8	2.2	1.5	0.31	0.23	0.38	0.02
Styrene	4	13	0.72	1.6	0.95	0.06	0.006
Styrene acrylic acid polymer #1	≥ 300	≥ 400	9	≥ 30	≥ 40	1	>1
Styrene acrylic acid polymer #2	≥ 300	≥ 400	9	≥ 30	≥ 40	1	>1
Styrene acrylic acid resin	≥ 300	≥ 400	9	≥ 30	≥ 40	1	>1
Tetramethyldecyldiol	31	30	30	3	3	3	0.3
Thioxanthone derivative	b	b	b	0.05 or ^a	0.05 or ^a	0.05 or ^a	0.005
Titanium diisopropoxide bis (2,4-pentanedionate)	≥ 220	≥ 110	≥ 19	≥ 20	≥ 10	≥ 5	0.5
Titanium isopropoxide	≥ 2900	≥ 2700	≥ 1500	≥ 270	≥ 60	≥ 50	5
Trimethylolpropane ethoxylate triacrylate	≥ 8	≥ 70	≥ 7	≥ 0.6	≥ 7	≥ 2	0.06
Trimethylolpropane propoxylate triacrylate	≤ 5.5	≤ 22	≤ 2.4	≤ 0.21	≤ 2	≤ 0.6	0.02
Trimethylolpropane triacrylate	4.1	23.0	2.4	0.21	2	0.6	0.02
Urea	> 1000	> 1000	> 1000	> 100	> 100	> 100	> 10

^a No effects are expected because the chemical is a polymer or a high-molecular weight compound. The high molecular weight (greater than 600 or 1,000) prevents passage through biological membranes.

^b No toxic effects are expected in a saturated solution during the prescribed test duration, or no toxic effects can be measured due to low water solubility.

^c The first value (0.1) pertains to the stable complex of this chemical, and the second value (>1.0) pertains to the hydrolysis products.

Table 3-B.4 Environmental Hazard Ranking of Flexographic Ink Chemicals

Chemical	CAS number	Lowest chronic value (mg/L)	Hazard rank ^a
Acrylated epoxy polymer		^b	L
Acrylated oligoamine polymer		^b	L
Acrylated polyester polymer #1		^b	L
Acrylated polyester polymer #2		^b	L
Acrylic acid-butyl acrylate-methyl methacrylate-styrene polymer	27306-39-4	^b	L
Acrylic acid polymer, acidic #1		1	M
Acrylic acid polymer, acidic #2		1	M
Acrylic acid polymer, insoluble		^b	L
Alcohols, C11-15-secondary, ethoxylated	68131-40-8	0.2	M
Amides, tallow, hydrogenated	61790-31-6	0.002	H
Ammonia	7664-41-7	0.06	H
Ammonium hydroxide	1336-21-6	1	M
Barium	7440-39-3	7.7	L
2-Benzyl-2-(dimethylamino)-4'-morpholinobutyrophenone	119313-12-1	0.2	M
Butyl acetate	123-86-4	1.5	M
Butyl acrylate-methacrylic acid-methyl methacrylate polymer	25035-69-2	^b	L
Butyl carbitol	112-34-5	40	L
C.I. Basic Violet 1, molybdatephosphate	67989-22-4	0.005	H
C.I. Basic Violet 1, molybdatetungstatephosphate	1325-82-2	0.005	H
C.I. Pigment Blue 15	147-14-8	^b	L
C.I. Pigment Blue 61	1324-76-1	≤ 1	M
C.I. Pigment Green 7	1328-53-6	^b	L
C.I. Pigment Red 23	6471-49-4	^b	L
C.I. Pigment Red 48, barium salt (1:1)	7585-41-3	2	M
C.I. Pigment Red 48, calcium salt (1:1)	7023-61-2	2	M
C.I. Pigment Red 52, calcium salt (1:1)	17852-99-2	3	M
C.I. Pigment Red 269	67990-05-0	^b	L
C.I. Pigment Violet 23	6358-30-1	^b	L
C.I. Pigment Violet 27	12237-62-6	0.005	H
C.I. Pigment White 6	13463-67-7	^b	L
C.I. Pigment White 7	1314-98-3	^b	L
C.I. Pigment Yellow 14	5468-75-7	^b	L
C.I. Pigment Yellow 74	6358-31-2	^b	L
Citric acid	77-92-9	1	M
D&C Red No.7	5281-04-9	2	M
Dicyclohexyl phthalate	84-61-7	0.03	H

Table 3-B.4 Environmental Hazard Ranking of Flexographic Ink Chemicals (continued)

Chemical	CAS number	Lowest chronic value (mg/L)	Hazard rank ^a
Diocetyl sulfosuccinate, sodium salt	577-11-7	0.5	M
Diphenyl (2,4,6-trimethylbenzoyl) phosphine oxide	75980-60-8	0.35	M
Dipropylene glycol diacrylate	57472-68-1	0.25	M
Dipropylene glycol methyl ether	34590-94-8	95	L
Distillates (petroleum), hydrotreated light	64742-47-8	0.05	H
Distillates (petroleum), solvent-refined light paraffinic	64741-89-5	^b	L
Erucamide	112-84-5	^b	L
Ethanol	64-17-5	60	L
Ethanolamine	141-43-5	0.85	M
Ethoxylated tetramethyldecyldiol	9014-85-1	> 10	L
Ethyl acetate	141-78-6	3.7	M
Ethyl carbitol	111-90-0	150	L
Ethyl 4-dimethylaminobenzoate	10287-53-3	1.3	M
2-Ethylhexyl diphenyl phosphate	1241-94-7	0.03	H
Fatty acid, dimer-based polyamide		^b	L
Fatty acids, C18-unsatd., dimers, polymers with ethylenediamine, hexamethylenediamine, and propionic acid	67989-30-4	^b	L
Glycerol propoxylate triacrylate	52408-84-1	≤ 0.13	H
n-Heptane	142-82-5	0.08	H
1,6-Hexanediol diacrylate	13048-33-4	0.07	H
1-Hydroxycyclohexyl phenyl ketone	947-19-3	2.6	M
Hydroxylamine derivative		0.4	M
2-Hydroxy-2-methylpropiophenone	7473-98-5	18	L
Hydroxypropyl acrylate	25584-83-2	1.7	M
Isobutanol	78-83-1	25	L
Isopropanol	67-63-0	48	L
Isopropoxyethoxytitanium bis(acetylacetonate)	6858-02-7	4.6	M
2-Isopropylthioxanthone	5495-84-1	0.004	H
4-Isopropylthioxanthone	83846-86-0	0.03	H
Kaolin	1332-58-7	50	L
Methylenedisalicylic acid	27496-82-8	3	M
2-Methyl-4'(methylthio)-2-morpholinopropiophenone	71868-10-5	3.6	M
Mineral oil	8012-95-1	0.002	H
Nitrocellulose	9004-70-0	> 10	L
Paraffin wax	8002-74-2	^b	L

Table 3-B.4 Environmental Hazard Ranking of Flexographic Ink Chemicals (continued)

Chemical	CAS number	Lowest chronic value (mg/L)	Hazard rank ^a
Phosphine oxide, bis(2,6-dimethoxybenzoyl) (2,4,4-trimethylpentyl)-	145052-34-2	0.6	M
Polyethylene	9002-88-4	^b	L
Polyethylene glycol	25322-68-3	> 10	L
Polyol derivative A		> 100	L
Polytetrafluoroethylene	9002-84-0	^b	L
Propanol	71-23-8	36	L
Propyl acetate	109-60-4	2.4	M
Propylene glycol methyl ether	107-98-2	160	L
Propylene glycol propyl ether	1569-01-3	≥ 44	L
Resin acids, hydrogenated, methyl esters	8050-15-5	0.001	H
Resin, acrylic	29003-01-4	1	M
Rosin, fumarated, polymer with diethylene glycol and pentaerythritol	68152-50-1	^b	L
Rosin, fumarated, polymer with pentaerythritol, 2-propenoic acid, ethenylbenzene, and (1-methylethylenyl)benzene		^b	L
Rosin, polymerized	65997-05-9	^b	L
Silamine, 1,1,1-trimethyl-N-(trimethylsilyl)-, hydrolysis products with silica	68909-20-6	>10	L
Silica	7631-86-9	^b	L
Silicone oil	63148-62-9	> 10	L
Siloxanes and silicones, di-Me, 3-hydroxypropyl Me, ethers with polyethylene glycol acetate	70914-12-4	> 10	L
Solvent naphtha (petroleum), light aliphatic	64742-89-8	0.23	M
Styrene	100-42-5	0.06	H
Styrene acrylic acid polymer #1	25005-34-1	1	M
Styrene acrylic acid polymer #2		1	M
Styrene acrylic acid resin		1	M
Tetramethyldecyldiol	126-86-3	3	M
Thioxanthone derivative		0.05	H
Titanium diisopropoxide bis (2,4-pentanedionate)	17927-72-9	5	M
Titanium isopropoxide	546-68-9	50	L
Trimethylolpropane ethoxylate triacrylate	28961-43-5	≥ 0.06	H
Trimethylolpropane propoxylate triacrylate	53879-54-2	≤ 0.21	M
Trimethylolpropane triacrylate	15625-89-5	0.21	M
Urea	57-13-6	> 100	L

^a Ranking based on the lowest estimated chronic value; H = high, M = medium, L = low.

^b No effects are expected because the chemical is a polymer or a high-molecular weight compound. The high molecular weight (greater than 600 or 1000) prevents passage through biological membranes.

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Appendix 3-C (Risk Chapter)

Supplementary Environmental Air Release Information

Mass Balance Calculations

The mass balance calculations for determining environmental releases from the ink formulations were conducted as follows for each formulation:

- Determine which components will volatilize (i.e., have vapor pressure greater than or equal to 0.001 mmHg at 25°C).
- Components that do not volatilize will remain on the substrate and are not expected to result in releases to the environment.
- Multiply volatile component masses by 99.9% to represent the amount of the compounds that volatilize.
- Multiply the mass of the component that volatilizes by 30% to determine the mass of the component that is released as fugitive emissions.
- Multiply mass of the component that volatilizes by 70% to determine the mass of the component that is captured by the exhaust system.
- For solvent-based formulations, multiply the mass of the component captured by the exhaust system by 5% to determine the mass of the component that is released as stack emissions (the catalytic oxidizer has a 95% destruction efficiency). For UV-cured and water-based formulations, the mass of the component that is released as stack emissions is equal to the mass of the component captured by the exhaust system (there are no controls on the UV-cured or water-based systems).
- Convert the release amounts from pounds per 7.5 hours to grams per second.

Sample Calculation of Environmental Releases

Following the methodology outlined above, the fugitive and stack releases for each component of the ink formulations were calculated. Applying the above methodology to the example data presented in Table 3.8 resulted in the data presented in Table D.1 below.

- The non-volatile components of the mixture are pigment, nitrocellulose, and resin; their vapor pressures are less than 0.001 mmHg at 25°C.
- From Table 3.8, the total mass of ink mixture consumed per 7.5 hour run is 95.815 pounds.

- The mass of ethanol consumed per 7.5 hour run is the total mass of ink mixture consumed (95.815 pounds) times the weight percent of ethanol in the ink mixture (19.8%) or 18.971 pounds. Of this amount, 99.9%, or 18.952 pounds, volatilizes per 7.5 hour run. The total mass of the five volatile components consumed per 7.5 hour run is 77.131 pounds. Applying the same methodology, the total mass of ink mixture that volatilizes per 7.5 hour run (99.9% of the amount consumed) is 77.054 pounds.

95.815 lbs. ink mixture consumed (19.8%) = 18.971 lbs. ethanol consumed
 18.971 lbs. ethanol consumed (99.9%) = 18.952 lbs. ethanol volatilized

Table 3-C Example Data for a Flexographic Printing Solvent-Based Formulation*

Chemical Component	Weight Percent	Vapor Pressure (mmHg at 25°C)	Fugitive Air Release (grams/sec)	Stack Air Release (grams/sec)
Ethanol	19.8%	59.03	0.096	0.011
Pigment	14.6%	<10 ⁻⁶	0	0
Propyl acetate	10.0%	33.7	0.048	0.0056
Propanol	43.3%	21	0.21	0.024
Nitrocellulose	2.7%	<10 ⁻⁶	0	0
Resin	2.2%	2x10 ⁻⁴	0	0
Glycol ether	1.3%	10.2	0.0063	0.00073
Extender compound	6.1%	0.001	0.029	0.0034

*The solvent-based formulation presented above is a fictional formulation.

In this example:

- The mass of ethanol released as fugitive emissions (30% of the total amount released) per 7.5 hour run is 5.686 pounds, which converts to 0.0957 grams of ethanol emitted per second. Similarly, the total mass of the five volatile components released as fugitive emissions per 7.5 hour run is 23.116 pounds, which converts to 0.389 grams of volatiles emitted per second.

18.952 lbs. ethanol volatilized (30%) = 5.686 lbs. fugitive ethanol emissions
 5.686 lbs./7.5hrs. (1000g/kg)(1kg/2.2lbs.)(1hr/3600sec)=0.0957 g/sec

- The mass of ethanol captured by the exhaust system per 7.5 hour run is the amount of ethanol that volatilizes (18.952 pounds) times the capture efficiency (70%), or 13.266 pounds. The corresponding total mass of the five volatile components captured by the exhaust system per 7.5 hour run is 77.054 pounds times the capture efficiency of 70%, or 53.938 pounds.

18.952 lbs. ethanol volatilized (70%) = 13.266 lbs. ethanol captured

- The mass of ethanol destroyed by the air control system is the amount of ethanol captured by the exhaust system (13.266 pounds) times the destruction efficiency (95%), or 12.603 pounds. The total mass of the five volatile components destroyed by the air control system is 53.938 pounds times the destruction efficiency of 95%, or 51.241 pounds.

13.266 lbs. ethanol captured (95%) = 12.603 lbs. ethanol destroyed

- The mass of ethanol released as stack emissions per 7.5 hour run from the exhaust system is 5% of the mass of ethanol captured (13.266 pounds), or 0.663 pounds, which converts to 0.011 grams of ethanol emitted per second. The total mass of ink mixture that is released as stack emissions per 7.5 hour run is 2.697 pounds, or 0.045 grams of ink mixture emitted per second.

13.266 lbs. ethanol captured (5%) = 0.663 lbs. ethanol stack emissions

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Appendix 3-D (Risk Chapter)

Environmental Air Release Data

Chemical category (<i>additives in italics</i>)	Blue			Green			White			Cyan			Magenta		
	Air releases per press (g/sec)														
	Total amount volatilized	Amount of fugitive releases	Amount of stack releases	Total amount volatilized	Amount of fugitive releases	Amount of stack releases	Total amount volatilized	Amount of fugitive releases	Amount of stack releases	Total amount volatilized	Amount of fugitive releases	Amount of stack releases	Total amount volatilized	Amount of fugitive releases	Amount of stack releases
Solvent-based Ink #S1 – Site 9B															
Alcohols	0.031	0.009	0.001	0.022	0.007	0.001	0.082	0.025	0.003	0.011	0.003	0.000	0.014	0.004	0.000
Alcohols	0.194	0.058	0.007	0.165	0.049	0.006	1.069	0.321	0.037				0.073	0.022	0.003
Alkyl acetates	0.103	0.031	0.004	0.118	0.035	0.004	0.219	0.066	0.008				0.063	0.019	0.002
Alkyl acetates	0.004	0.001	0.000				0.082	0.025	0.003						
Propylene glycol ethers				0.022	0.007	0.001				0.026	0.008	0.001	0.021	0.006	0.001
Alkyl acetates				0.022	0.007	0.001				0.042	0.013	0.001	0.010	0.003	0.000
Alcohols				0.329	0.099	0.011				0.384	0.115	0.013	0.353	0.106	0.012
Hydrocarbons - low molecular weight							0.945	0.284	0.033						
Additive: Propanol	0.106	0.032	0.004				0.053	0.016	0.002						
Additive: Propyl acetate										0.025	0.007	0.001			
Additive: Trade secret													ND ^b	ND	ND
Additive: Propylene glycol ether													0.018	0.005	0.001
Solvent-based Ink #S2 – Site 5															
Alcohols	0.574	0.172	0.020	0.550	0.165	0.019	1.112	0.334	0.039	0.768	0.230	0.027	0.519	0.156	0.018
Alkyl acetates	0.132	0.039	0.005	0.117	0.035	0.004	0.053	0.016	0.002	0.217	0.065	0.008	0.134	0.040	0.005
Hydrocarbons - low molecular weight	0.119	0.036	0.004	0.176	0.053	0.006	0.584	0.175	0.020	0.152	0.046	0.005	0.266	0.080	0.009
Alcohols	0.071	0.021	0.002	0.081	0.024	0.003	0.120	0.036	0.004	0.106	0.032	0.004	0.086	0.026	0.003
Hydrocarbons - low molecular weight	0.006	0.002	0.000	0.005	0.001	0.000	0.025	0.007	0.001	0.010	0.003	0.000	0.009	0.003	0.000
Alcohols	0.073	0.022	0.002	0.084	0.025	0.003				0.096	0.029	0.003	0.146	0.044	0.005

Chemical category (<i>additives in italics</i>)	Blue			Green			White			Cyan			Magenta		
	Air releases per press (g/sec)														
	Total amount volati- lized	Amount of fugitive releases	Amount of stack releases	Total amount volati- lized	Amount of fugitive releases	Amount of stack releases	Total amount volati- lized	Amount of fugitive releases	Amount of stack releases	Total amount volati- lized	Amount of fugitive releases	Amount of stack releases	Total amount volati- lized	Amount of fugitive releases	Amount of stack releases
Solvent-based Ink #S2 – Site 7															
Alcohols	0.243	0.073	0.008	0.239	0.072	0.008	0.461	0.138	0.016	0.206	0.062	0.007	0.252	0.076	0.009
Alkyl acetates	0.218	0.065	0.008	0.203	0.061	0.007	0.263	0.079	0.009	0.191	0.057	0.007	0.223	0.067	0.008
Hydrocarbons - low molecular weight	0.092	0.027	0.003	0.100	0.030	0.003	0.378	0.113	0.013	0.062	0.019	0.002	0.166	0.050	0.006
Alcohols	0.055	0.016	0.002	0.046	0.014	0.002	0.078	0.023	0.003	0.043	0.013	0.001	0.091	0.027	0.003
Hydrocarbons - low molecular weight	0.005	0.001	0.000	0.002	0.001	0.000	0.016	0.005	0.001	0.004	0.001	0.000	0.006	0.002	0.000
Alcohols	0.609	0.183	0.021	0.627	0.188	0.022				0.497	0.149	0.017	0.644	0.193	0.022
Additive: Propanol							1.029	0.309	0.036						
Solvent-based Ink #S2 – Site 10															
Alcohols	0.197	0.059	0.007	0.244	0.073	0.008	0.407	0.122	0.014	0.199	0.060	0.007	0.208	0.062	0.007
Alkyl acetates	0.126	0.038	0.004	0.125	0.038	0.004	0.142	0.043	0.005	0.154	0.046	0.005	0.062	0.019	0.002
Hydrocarbons - low molecular weight	0.074	0.022	0.003	0.102	0.030	0.004	0.334	0.100	0.012	0.060	0.018	0.002	0.137	0.041	0.005
Alcohols	0.045	0.013	0.002	0.047	0.014	0.002	0.069	0.021	0.002	0.042	0.013	0.001	0.075	0.023	0.003
Hydrocarbons - low molecular weight	0.004	0.001	0.000	0.003	0.001	0.000	0.014	0.004	0.000	0.004	0.001	0.000	0.005	0.001	0.000
Alcohols	0.603	0.181	0.021	0.659	0.198	0.023				0.345	0.104	0.012	0.792	0.238	0.028
Additive: Propanol							1.220	0.366	0.043						
Additive: Propylene glycol monomethyl ether										0.315	0.095	0.011	0.069	0.021	0.002
Additive: 2-Methoxy-1- propanol										0.006	0.002	0.000	0.001	0.000	0.000

Chemical category (<i>additives in italics</i>)	Blue			Green			White			Cyan			Magenta		
	Air releases per press (g/sec)														
	Total amount volati- lized	Amount of fugitive releases	Amount of stack releases	Total amount volati- lized	Amount of fugitive releases	Amount of stack releases	Total amount volati- lized	Amount of fugitive releases	Amount of stack releases	Total amount volati- lized	Amount of fugitive releases	Amount of stack releases	Total amount volati- lized	Amount of fugitive releases	Amount of stack releases
Water-based Ink #W1 – Site 4															
Amides or nitrogenous compounds	0.013	0.004	0.009	0.011	0.003	0.008	0.082	0.024	0.057	0.003	0.001	0.002	0.003	0.001	0.002
Alcohols	0.100	0.030	0.070	0.057	0.017	0.040	0.164	0.049	0.114	0.012	0.004	0.009			
Ethylene glycol ethers	0.032	0.009	0.022	0.019	0.008	0.013				0.022	0.007	0.016	0.023	0.007	0.016
Alcohols	0.005	0.001	0.004	0.003	0.001	0.002									
Hydrocarbons - high molecular weight	0.019	0.006	0.013	0.010	0.003	0.007									
Water-based Ink #W2 – Site 1															
Amides or nitrogenous compounds	0.002	0.000	0.001	0.003	0.001	0.002	0.092	0.028	0.065				0.002	0.001	0.002
Hydrocarbons - high molecular weight	0.001	0.000	0.001	0.002	0.001	0.001	0.015	0.005	0.011				0.001	0.000	0.000
Hydrocarbons - low molecular weight	0.001	0.000	0.000	0.001	0.000	0.001									
Alcohols							0.038	0.011	0.027						
Ethylene glycol ethers							0.038	0.011	0.027						
Additive: Isobutanol	0.001	0.000	0.000							0.001	0.000	0.001	0.001	0.000	0.001
Additive: Ethyl carbitol	0.001	0.000	0.000							0.001	0.000	0.001	0.001	0.000	0.001
Additive: Propanol	0.043	0.013	0.030				0.009	0.003	0.007						
Additive: Ammonia										0.002	0.001	0.001			
Water-based Ink #W3 – Site 2															
Amides or nitrogenous compounds	0.021	0.006	0.015	0.028	0.008	0.020	0.046	0.014	0.032	0.016	0.005	0.011	0.017	0.005	0.012
Propylene glycol ethers										0.002	0.001	0.002	0.003	0.001	0.002
Alcohols				0.013	0.004	0.009									
Ethylene glycol ethers				0.006	0.002	0.004									
Alcohols							0.013	0.004	0.009						
Additive: Ammonia	0.002	0.000	0.001	0.001	0.000	0.001	0.002	0.000	0.001	0.002	0.001	0.001	0.002	0.001	0.001
Additive: Propanol	0.019	0.006	0.013	0.010	0.003	0.007	0.039	0.012	0.027						
Additive: Other components	ND	ND	ND												
Water-based Ink #W3 – Site 3															

Chemical category (<i>additives in italics</i>)	Blue			Green			White			Cyan			Magenta		
	Air releases per press (g/sec)														
	Total amount volati- lized	Amount of fugitive releases	Amount of stack releases	Total amount volati- lized	Amount of fugitive releases	Amount of stack releases	Total amount volati- lized	Amount of fugitive releases	Amount of stack releases	Total amount volati- lized	Amount of fugitive releases	Amount of stack releases	Total amount volati- lized	Amount of fugitive releases	Amount of stack releases
Amides or nitrogenous compounds	0.015	0.004	0.010	0.028	0.008	0.019	0.065	0.020	0.046	0.008	0.002	0.005	0.005	0.001	0.003
Propylene glycol ethers										0.001	0.000	0.009	0.001	0.000	0.001
Alcohols				0.012	0.004	0.009									
Ethylene glycol ethers				0.006	0.002	0.004									
Alcohols							0.018	0.005	0.013						
Additive: Ammonia	0.012	0.004	0.009				0.020	0.006	0.014	0.002	0.001	0.002	0.002	0.001	0.001
Additive: Propanol	0.033	0.010	0.023				0.147	0.044	0.103						
Additive: Extender							ND	ND	ND						
Additive: 2-Butoxyethanol													0.001	0.000	0.001
Water-based Ink #W4 – Site 9A															
Alcohols	0.011	0.003	0.008	0.005	0.001	0.004	0.050	0.015	0.035	0.017	0.005	0.012	0.007	0.002	0.005
Amides or nitrogenous compounds	0.001	0.000	0.001	0.001	0.000	0.001	0.012	0.004	0.009	0.002	0.001	0.001	0.002	0.001	0.002
Hydrocarbons - high molecular weight	0.001	0.000	0.001	0.001	0.000	0.001	0.012	0.004	0.009	0.001	0.000	0.009	0.001	0.000	0.001
Amides or nitrogenous compounds	0.001	0.000	0.001	0.005	0.002	0.004				0.001	0.000	0.001	0.007	0.002	0.005
Alcohols				0.017	0.005	0.012	0.050	0.015	0.035				0.010	0.003	0.007
Propylene glycol ethers	0.011	0.003	0.008												
Propylene glycol ethers	0.011	0.003	0.008							0.017	0.005	0.012			
Amides or nitrogenous compounds				0.001	0.000	0.001	0.012	0.004	0.009						
Alcohols										0.005	0.001	0.003			
Additive: Ammonia	0.002	0.000	0.001	0.001	0.000	0.001				0.002	0.000	0.001	0.001	0.000	0.000
Additive: Propanol	0.009	0.003	0.007							0.010	0.003	0.007			
Additive: Ethyl carbitol										ND	ND	ND			
Additive: Petroleum distillate										ND	ND	ND			
UV-cured Ink #U1 – Site 11															
Amides or nitrogenous compounds	0.003	0.001	0.002	0.004	0.001	0.002	0.020	0.006	0.014	0.001	0.000	0.001	0.001	0.000	0.001

Chemical category (<i>additives in italics</i>)	Blue			Green			White			Cyan			Magenta		
	Air releases per press (g/sec)														
	Total amount volati- lized	Amount of fugitive releases	Amount of stack releases	Total amount volati- lized	Amount of fugitive releases	Amount of stack releases	Total amount volati- lized	Amount of fugitive releases	Amount of stack releases	Total amount volati- lized	Amount of fugitive releases	Amount of stack releases	Total amount volati- lized	Amount of fugitive releases	Amount of stack releases
Aromatic esters	0.016	0.005	0.011	0.017	0.005	0.012	0.096	0.029	0.067	0.006	0.002	0.004	0.006	0.002	0.004
Additive: 1,6-Hexanediol diacrylate				0.010	0.003	0.007									
UV-cured Ink #U2 – Site 6															
Acrylated polyols	0.059	0.018	0.041	0.050	0.015	0.034	0.437	0.131	0.306	0.019	0.006	0.013	0.031	0.009	0.021
Acrylated polyols	0.042	0.013	0.029	0.014	0.004	0.010	0.177	0.053	0.124	0.021	0.006	0.015	0.024	0.007	0.017
Aromatic ketones	0.014	0.004	0.010	0.007	0.002	0.005	0.049	0.015	0.034	0.006	0.002	0.004	0.009	0.003	0.006
UV-cured Ink #U3 – Site 8															
Aromatic esters	0.006	0.002	0.005	0.006	0.002	0.004	0.057	0.017	0.040	0.005	0.001	0.003	0.004	0.001	0.003
Amides or nitrogeneous compounds	0.001	0.000	0.001	0.001	0.000	0.001	0.012	0.004	0.009	0.001	0.000	0.001	0.001	0.000	0.001
Acrylated polyols	0.028	0.008	0.020	0.026	0.008	0.019				0.020	0.006	0.014	0.017	0.005	0.012

^a Shaded areas indicate where data are not applicable (i.e., the chemical category was not found in the particular color and formulation). If a chemical was found in a formulation, but resulted in zero air releases, then the chemical category was not included in the table for that formulation.

^b No data or information available.

Appendix 3-E (Risk Chapter)

Supplemental Occupational Exposure Assessment Methodology

Scenario I

The mass balance calculations for Scenario I were conducted as follows for each chemical with a vapor pressure less than 35 mmHg at 25°C (using the open surface model and the Fehrenbacher and Hummel vapor generation rate)¹:

- All concentrations were converted from weight percent to mole percent.
- The diffusivity of each chemical in the formulation was calculated using the following equation:

$$D_{ab} = (4.09 \times 10^{-5} T^{1.9} (1/29 + 1/M)^{0.5} M^{-0.33}) / P_t$$

where:

D_{ab}	=	Diffusivity, cm ² /sec
T	=	Temperature, K
M	=	Molecular weight, g/g-mole
P_t	=	Total pressure, atm

- The vapor generation rate of each chemical in the formulation was calculated using the following equation (Fehrenbacher and Hummel vapor generation rate):

$$G_i = (0.02 M X_i P_i^* (D_{ab} v_z / (P_i z))^{0.5}) / (RT)$$

where:

G_i	=	Vapor generation rate of substance i, g/m ² -sec
M	=	Molecular weight, g/g-mole
X_i	=	Mole fraction of substance i in solution, dimensionless
P_i^*	=	Vapor pressure of pure substance i, mmHg at 25°C
D_{ab}	=	Diffusivity, cm ² /sec
v_z	=	Air velocity above can, m/sec
P_i	=	The constant pi, 3.14159
z	=	Pool length in direction of air flow, m
R	=	Gas constant, 0.0624 mmHg-m ³ /mol-K
T	=	Temperature, K

- Using the assumptions presented in Section 3.5, the potential inhalation dose rate of each chemical in the formulation was estimated using the following equation:

$$I = 0.21G_i A t$$

where:

I	=	Total amount of substance inhaled, mg/day
G _i	=	Vapor generation rate of substance i, g/m ² -sec
A	=	Surface area of liquid/air interface, m ²
t	=	Duration of exposure, sec/day

The mass balance calculations for Scenario I were conducted for each chemical with a vapor pressure greater than or equal to 35 mmHg at 25°C (using the open surface model and the Engel and Reilly vapor generation rate)²:

- All concentrations were converted from weight percent to mole percent.
- The “generalized” Schmidt number was calculated using the following equation:

$$Sc = (2.94T^{-0.9} + 0.0329T^{0.1})M^{0.33} / (1/28.9 + 1/M)^{0.5}$$

where:

Sc	=	Schmidt number, dimensionless
T	=	Temperature, K
M	=	Molecular weight, g/g-mole

- The vapor generation rate of each chemical in the formulation was calculated using the following equation (Engel and Reilly vapor generation rate):

$$G_i' = (2.1 \times 10^{-7} M X_i P_i^* A v_z^{0.78}) / (z^{0.11} Sc^{0.67} T)$$

where:

G _i '	=	Vapor generation rate of substance i, g/sec (Note: the units of the Fehrenbacher and Hummel vapor generation rate, G _i , are g/m ² -sec, the units of the Engel and Reilly vapor generation rate, G _i ', are g/sec)
M	=	Molecular weight, g/g-mole
X _i	=	Mole fraction of substance i in solution, dimensionless
P _i *	=	Vapor pressure of pure substance i, mmHg at 25°C
A	=	Surface area of liquid/air interface, cm ²
v _z	=	Air velocity above can, ft/min
z	=	Pool length in direction of air flow, cm
Sc	=	Schmidt number, dimensionless
T	=	Temperature, K

- Using the assumptions presented in Section 3.5, the potential inhalation dose rate of each chemical in the formulation was estimated using the following equation:

$$I = 0.21G_i't$$

where:

I	=	Total amount of substance inhaled, mg/day
G_i'	=	Vapor generation rate of substance i, g/sec
t	=	Duration of exposure, sec/day

Scenario II

The mass balance calculations for Scenario II were conducted for each formulation (printing room mass balance model):

- The concentration of each chemical in the printing room was calculated using the following equation:

$$C_v = (1.7 \times 10^5 T G_i A) / (M Q k)$$

where:

C_v	=	Airborne concentration, ppm
T	=	Ambient temperature, K
G_i	=	Vapor generation rate of substance i, g/m ² -sec
A	=	Surface area of liquid/air interface, m ²
M	=	Molecular weight, g/g-mole
Q	=	Ventilation rate, ft ³ /min
k	=	Mixing factor, dimensionless

It was assumed that $G_i A$ equals the fugitive emission rate.

- The volume-based concentrations calculated above were converted to mass-based concentrations using the equation:

$$C_m = C_v M / V$$

where:

C_m	=	Airborne concentration, mg/m ³
C_v	=	Airborne concentration, ppm
M	=	Molecular weight, g/g-mole
V	=	Molar volume of ideal gas at 25°C and 760 mmHg, L/mole

- Calculate the potential inhalation dose rate of each chemical in the formulation using the following equation:

$$I = bC_m t$$

where:

I	=	Total amount of substance inhaled, mg/day
b	=	Worker inhalation rate, m ³ /hour
C _m	=	Airborne concentration, mg/m ³
t	=	Duration of exposure, hour/day

Assumptions — Occupational Exposure Assessment Methodology

Additional assumptions associated with the Fehrenbacher and Hummel vapor generation rate are listed below:

- The surface temperature of the liquid and the evaporation rate are constant.
- The heat of evaporation is provided by the surroundings.
- Diffusion at the edge of the pool and in the direction of the air stream is negligible.
- The air velocity is constant and flowing in only one direction.
- There is no mixing in the area above the pool of liquid.
- There is no local exhaust present.
- There are no physical barriers present at the edges of the pool.
- There are no effects from heat transfer.
- The incoming air flowing over the pool of liquid is free of the contaminant of concern.

Sample Calculation of Occupational Exposures

Following the method outlined above, occupational exposures for each chemical in the ink formulations were calculated. Applying this methodology to the example data presented in Table [3.10] results in the data presented in Table 3-E, below.

Table 3-E Example Data for a Flexographic Printing Solvent-Based Formulation ^a

Chemical component	Weight percent	Vapor pressure (mmHg at 25°C)	Scenario I (mg/day, typical)	Scenario II (mg/day, typical)
Ethanol	19.8%	59.03	6.2	530
Pigment	14.6%	<10 ⁻⁶	0	0
Propyl acetate	10.0%	33.7	2.8	270
Propanol	43.3%	21	8.4	1,200
Nitrocellulose	2.7%	<10 ⁻⁶	0	0
Resin	2.2%	2x10 ⁻⁴	0	0
Glycol ether	1.3%	10.2	0.11	35
Extender	6.1%	0.001	4.3x10 ⁻⁵	160

^aThe solvent-based formulation presented above is a fictional formulation.

Stepping through the calculations for ethanol:

Scenario I:

Ethanol has a vapor pressure greater than 35 mmHg at 25°C, so the open surface model and the Engel and Reilly vapor generation rate were used to estimate the worker exposure in Scenario I.

$$\bullet \quad Sc = (2.94T^{-0.9} + 0.0329T^{0.1})M^{0.33} / (1/28.9 + 1/M)^{0.5}$$

where:

$$T = 298 \text{ K (Table [3.11])}$$

$$M = 50 \text{ g/g-mole (Table [3.10])}$$

Therefore:

$$Sc = (2.94(298)^{-0.9} + 0.0329(298)^{0.1})50^{0.33} / (1/28.9 + 1/50)^{0.5}$$

$$Sc = 1.18$$

$$\bullet \quad G_i' = (2.1 \times 10^{-7} MPa v_z^{0.78}) / (z^{0.11} Sc^{0.67} T)$$

where:

$$M = 50 \text{ g/g-mole (Table [3.10])}$$

$$X_i = 0.305 \text{ (Table [3.10])}$$

$$P_i^* = 59.03 \text{ mmHg at } 25^\circ\text{C (Table [3.10])}$$

$$A = [P_i (z/2)^2] = [3.14159(30.48/2)^2] \text{ cm}^2 = 729.659 \text{ cm}^2$$

(calculated from the diameter given below ($z=0.3048\text{m}$))

$$v_z = 100 \text{ ft/min (Table [3.11])}$$

$$z = 1 \text{ ft} = 30.48 \text{ cm (Table [3.11])}$$

$$Sc = 1.18 \text{ (calculated above)}$$

$$T = 298 \text{ K (Table [3.11])}$$

Therefore:

$$G_i' = [2.1 \times 10^{-7} (50)(0.305)(59.03)(729.659)(100^{0.78})] / [(30.48^{0.11})(1.18^{0.67})(298)]$$

$$G_i' = 0.0103 \text{ g/sec}$$

$$\bullet \quad I = 0.21 G_i' t$$

where:

$$G_i' = 0.0103 \text{ g/sec (calculated above)}$$

$$t = 48 \text{ min/day} = 2,880 \text{ sec/day (Table [3.11])}$$

Therefore:

$$I = 0.21 (0.0103)(2,880)$$

$$I = 6.23 \text{ mg/day}$$

Scenario II:

- $C_v = (1.7 \times 10^5 T G_i A) / (MQk)$

where:

$$\begin{aligned} T &= 298 \text{ K (Table [3.11])} \\ G_i A &= \text{fugitive emission rate} = 0.096 \text{ g/sec (Table [D.1])} \\ M &= 50 \text{ g/g-mole (Table [3.10])} \\ Q &= 7,000 \text{ ft}^3/\text{min (Table [3.11])} \\ k &= 0.5 \text{ (Table [3.11])} \end{aligned}$$

Therefore:

$$\begin{aligned} C_v &= [1.7 \times 10^5 (298)(0.096)] / [(50)(7,000)(0.5)] \\ C_v &= 27.7 \text{ ppm} \end{aligned}$$

- $C_m = C_v M / V$

where:

$$\begin{aligned} C_v &= 27.7 \text{ ppm (calculated above)} \\ M &= 50 \text{ g/g-mole (Table [3.10])} \\ V &= 24.45 \text{ L/mole (molar volume of an ideal gas)} \end{aligned}$$

Therefore:

$$\begin{aligned} C_m &= [(27.7)(50)] / (24.45) \\ C_m &= 56.7 \text{ mg/m}^3 \end{aligned}$$

- $I = b C_m t$

where:

$$\begin{aligned} b &= 1.25 \text{ m}^3/\text{hour (medium work inhalation rate [3])} \\ C_m &= 56.7 \text{ mg/m}^3 \text{ (calculated above)} \\ t &= 7.5 \text{ hours/day (Table [4.1])} \end{aligned}$$

Therefore:

$$\begin{aligned} I &= (1.25)(56.7)(7.5) \\ I &= 531 \text{ mg/day} \end{aligned}$$

Ethanol has a vapor pressure greater than 35 mmHg at 25°C; therefore, the Engel and Reilly vapor generation rate was used for Scenario I. Propyl alcohol has a vapor pressure less than 35 mmHg at 25°C; therefore, the Fehrenbacher and Hummel vapor generation rate was used for Scenario I. These calculations are shown below:

Scenario I:

- $D_{ab} = (4.09 \times 10^{-5} T^{1.9} (1/29 + 1/M)^{0.5} M^{-0.33}) / P_t$

where:

$$T = 298 \text{ K (Table [3.11])}$$

$$M = 60 \text{ g/g-mole (Table [3.10])}$$

$$P_t = 1 \text{ atm (standard pressure)}$$

Therefore:

$$D_{ab} = (4.09 \times 10^{-5} (298)^{1.9} (1/29 + 1/60)^{0.5} 60^{-0.33}) / 1$$

$$D_{ab} = 0.120 \text{ cm}^2/\text{sec}$$

- $G_i = \{0.02 M X_i P_i^* [D_{ab} v_z / ((P_i) z)]^{0.5}\} / R T$

where:

$$M = 60 \text{ g/g-mole (Table [3.10])}$$

$$X_i = 0.555 \text{ (Table [3.10])}$$

$$P_i^* = 21 \text{ mmHg at } 25^\circ\text{C (Table [3.10])}$$

$$D_{ab} = 0.120 \text{ cm}^2/\text{sec (calculated above)}$$

$$v_z = 100 \text{ ft/min} = 0.508 \text{ m/sec (Table [3.11])}$$

$$P_i = \text{The constant } P_i, 3.14159$$

$$z = 1 \text{ ft} = 0.3048 \text{ m (Table [3.11])}$$

$$R = 0.0624 \text{ mmHg-m}^3/\text{mol-K (gas constant)}$$

$$T = 298 \text{ K (Table [3.11])}$$

Therefore:

$$G_i = \{0.02(60)(0.555)(21)[(0.120)(0.508)/((3.14159)(0.3048))]^{0.5}\} / [(0.0624)(298)]$$

$$G_i = 0.190 \text{ g/m}^2\text{-sec}$$

- $I = 0.21 G_i A t$

where:

$$G_i = 0.190 \text{ g/m}^2\text{-sec (calculated above)}$$

$$A = 0.0730 \text{ m}^2 \text{ (calculated from the diameter given above (} z=0.3048\text{m))}$$

$$t = 48 \text{ min/day} = 2,880 \text{ sec/day (Table [3.11])}$$

Therefore:

$$I = 0.21 (0.190)(0.0730)(2,880)$$

$$I = 8.39 \text{ mg/day}$$

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3. Chemical Engineering Branch (CEB). *Manual for the Preparation of Engineering Assessments*, U.S. Environmental Protection Agency, February, 1991.

Appendix 3-F (Risk Chapter) Occupational Exposure Data

Table 3-F.1 Occupational Exposure Results, Scenario II (Press Room)^a

Chemical category (<i>additives in italics</i>)	Blue			Green			White			Cyan			Magenta		
	Inhalation exposure (mg/day)	Dermal exposure (mg/day)		Inhalation exposure (mg/day)	Dermal exposure (mg/day)		Inhalation exposure (mg/day)	Dermal exposure (mg/day)		Inhalation exposure (mg/day)	Dermal exposure (mg/day)		Inhalation exposure (mg/day)	Dermal exposure (mg/day)	
		min.	max.		min.	max.		min.	max.		min.	max.		min.	max.
Solvent-based Ink #S1 – Site 9B															
Alcohols	204	62	186	146	35	106	547	21	63	71	21	63	92	26	79
Polyol derivatives	0	83	248	0	71	212	0	11	32	0	53	158	0	49	148
Resins	0	72	217	0	26	79	0	74	221	0	95	285	0	61	182
Water	0	4	12	0	4	13	0	2	6	0	2	6	0	2	6
Alcohols	1,293	392	1,177	1,096	265	794	7,116	273	820				490	141	424
Alkyl acetates	687	208	625	785	189	568	1,457	56	168				420	121	363
Resins	0	7	22	0	9	26				0	8	25	0	5	14
Pigments - organometallic	0	83	248	0	35	106				0	169	506			
Alcohols				2,190	529	1,586				2,561	766	2,297	2,349	678	2,033
Alkyl acetates				146	35	106				282	84	253	70	20	61
Propylene glycol ethers				146	35	106				176	53	158	140	40	121
Resins	0	72	217				0	116	347						
Organotitanium compounds	0	10	31				0	6	19						
Alkyl acetates	24	7	22				547	21	63						
Organic acids or salts	0	1	3				0	2	6						
Pigments - organometallic	0	52	155												
Aromatic esters	0	31	93												
Organic acids or salts	0	1	3												
Inorganics				0	4	13									
Pigments - organic				0	62	185									
Pigments - inorganic							0	452	1,357						
Hydrocarbons - low molecular weight							6,295	242	726						
Hydrocarbons - high molecular weight							0	11	32						
Inorganics													0	20	61
Pigments - organometallic													0	61	182
Pigments - organometallic													0	7	20
Additive: Propanol	706	214	642				353	14	41						

Table 3-F.1 Occupational Exposure Results, Scenario II (Press Room)^a (continued)

Chemical category (<i>additives in italics</i>)	Blue			Green			White			Cyan			Magenta		
	Inhalation exposure (mg/day)	Dermal exposure (mg/day)		Inhalation exposure (mg/day)	Dermal exposure (mg/day)		Inhalation exposure (mg/day)	Dermal exposure (mg/day)		Inhalation exposure (mg/day)	Dermal exposure (mg/day)		Inhalation exposure (mg/day)	Dermal exposure (mg/day)	
		min.	max.		min.	max.		min.	max.		min.	max.		min.	max.
Additive: <i>Propyl acetate</i>										164	49	147			
Additive: <i>Propylene glycol propyl ether</i>													119	34	103
Additive: <i>Trade secret</i>													ND ^b	ND	ND
Solvent-based Ink #S2 – Site 5															
Alcohols	3,825	486	1,457	3,664	413	1,239	7,410	309	928	5,113	444	1,333	3,459	387	1,160
Alkyl acetates	877	111	334	777	88	263	351	15	44	1,442	125	376	892	100	299
Hydrocarbons - low molecular weight	790	100	301	1,172	132	396	3,889	162	487	1,016	88	265	1,771	198	594
Alcohols	475	60	181	540	61	183	800	33	100	707	61	184	975	109	327
Resins	0	267	801	0	279	838	0	266	798	0	286	858	0	193	580
Hydrocarbons - low molecular weight	40	5	15	31	3	10	166	7	21	64	6	17	63	7	21
Siloxanes	0	10	31	0	11	34	0	12	35	0	11	34	0	12	35
Amides or nitrogeous compounds	0	10	31	0	11	34	0	12	35	0	11	34	0	12	35
Organic acids or salts	0	10	31	0	11	34	0	12	35	0	11	34	0	12	35
Alcohols	484	61	184	561	63	190				643	56	168	576	64	193
Polyol derivatives	0	38	114	0	22	66				0	38	114	0	30	91
Amides or nitrogeous compounds	0	10	31	0	11	34				0	11	34	0	12	35
Organophosphorous compounds	0	10	31	0	11	34				0	11	34	0	12	35
Pigments - organometallic	0	77	230	0	21	62				0	140	419			
Pigments - inorganic				0	94	283	0	472	1,417						
Pigments - organometallic	0	43	129												
Pigments - organic				0	46	138									
Pigments - organometallic				0	20	60									
Pigments - inorganic													0	152	457

Table 3-F.1 Occupational Exposure Results, Scenario II (Press Room)^a (continued)

Chemical category (<i>additives in italics</i>)	Blue			Green			White			Cyan			Magenta		
	Inhalation exposure (mg/day)	Dermal exposure (mg/day)		Inhalation exposure (mg/day)	Dermal exposure (mg/day)		Inhalation exposure (mg/day)	Dermal exposure (mg/day)		Inhalation exposure (mg/day)	Dermal exposure (mg/day)		Inhalation exposure (mg/day)	Dermal exposure (mg/day)	
		min.	max.		min.	max.		min.	max.		min.	max.		min.	max.
Solvent-based Ink #S2 – Site 7															
Alcohols	1,619	191	573	1,591	191	574	3,073	149	447	1,373	195	586	1,677	188	563
Alkyl acetates	1,449	171	513	1,350	162	487	1,749	85	255	1,273	181	543	1,485	166	498
Hydrocarbons - low molecular weight	610	72	216	663	80	239	2,519	122	366	416	59	177	1,103	123	370
Alcohols	367	43	130	305	37	110	518	25	75	289	41	124	607	68	204
Resins	0	192	575	0	169	506	0	200	600	0	192	575	0	120	361
Hydrocarbons - low molecular weight	31	4	11	17	2	6	107	5	16	26	4	11	39	4	13
Siloxanes	0	7	22	0	7	21	0	9	26	0	7	22	0	7	22
Amides or nitrogeneous compounds	0	7	22	0	7	21	0	9	26	0	7	22	0	7	22
Organic acids or salts	0	7	22	0	7	21	0	9	26	0	7	22	0	7	22
Alcohols	4,053	478	1,434	4,173	502	1,506				3,312	471	1,414	4,290	480	1,439
Polyol derivatives	0	27	81	0	13	40				0	25	76	0	19	57
Amides or nitrogeneous compounds	0	7	22	0	7	21				0	7	22	0	7	22
Organophosphorous compounds	0	7	22	0	7	21				0	7	22	0	7	22
Pigments - organometallic	0	55	165	0	12	37				0	94	281			
Pigments - inorganic				0	57	171	0	355	1,066						
Pigments - organometallic	0	31	93												
Pigments - organic				0	28	83									
Pigments - organometallic				0	12	36									
Pigments - inorganic													0	95	285
Additive: Propanol							6,855	332	997						

Table 3-F.1 Occupational Exposure Results, Scenario II (Press Room) ^a (continued)

Chemical category (<i>additives in italics</i>)	Blue			Green			White			Cyan			Magenta		
	Inhalation exposure (mg/day)	Dermal exposure (mg/day)		Inhalation exposure (mg/day)	Dermal exposure (mg/day)		Inhalation exposure (mg/day)	Dermal exposure (mg/day)		Inhalation exposure (mg/day)	Dermal exposure (mg/day)		Inhalation exposure (mg/day)	Dermal exposure (mg/day)	
		min.	max.		min.	max.		min.	max.		min.	max.		min.	max.
Solvent-based Ink #S2 – Site 10															
Alcohols	1,310	183	548	1,624	199	597	2,712	140	421	1,324	175	524	1,386	164	492
Alkyl acetates	838	117	350	835	102	307	945	49	147	1,028	135	406	415	49	147
Hydrocarbons - low molecular weight	494	69	206	677	83	249	2,223	115	345	401	53	159	911	108	323
Alcohols	297	41	124	312	38	115	457	24	71	279	37	110	502	59	178
Resins	0	183	550	0	175	525	0	188	565	0	171	514	0	105	316
Hydrocarbons - low molecular weight	25	4	11	18	2	6	95	5	15	25	3	10	32	4	11
Siloxanes	0	7	21	0	7	22	0	8	24	0	7	20	0	6	19
Amides or nitrogeneous compounds	0	7	21	0	7	22	0	8	24	0	7	20	0	6	19
Organic acids or salts	0	7	21	0	7	22	0	8	24	0	7	20	0	6	19
Alcohols	4,019	560	1,681	4,387	537	1,612				2,301	303	910	5,274	624	1,871
Polyol derivatives	0	26	78	0	14	41				0	23	68	0	17	50
Amides or nitrogeneous compounds	0	7	21	0	7	22				0	7	20	0	6	19
Organophosphorous compounds	0	7	21	0	7	22				0	7	20	0	6	19
Pigments - organometallic	0	53	158	0	13	39				0	84	251			
Pigments - inorganic				0	59	177	0	334	1,003						
Pigments - organometallic	0	29	88												
Pigments - organic				0	29	86									
Pigments - organometallic				0	13	38									
Pigments - inorganic													0	83	249
Additive: Propanol							8,128	420	1,261						
Additive: Propylene glycol methyl ether										2,099	277	830	463	55	164
Additive: 2-Methoxy-1-propanol										43	6	17	9	1	3

Table 3-F.1 Occupational Exposure Results, Scenario II (Press Room)^a (continued)

Chemical category (<i>additives in italics</i>)	Blue			Green			White			Cyan			Magenta		
	Inhalation exposure (mg/day)	Dermal exposure (mg/day)		Inhalation exposure (mg/day)	Dermal exposure (mg/day)		Inhalation exposure (mg/day)	Dermal exposure (mg/day)		Inhalation exposure (mg/day)	Dermal exposure (mg/day)		Inhalation exposure (mg/day)	Dermal exposure (mg/day)	
		min.	max.		min.	max.		min.	max.		min.	max.		min.	max.
Water-based Ink #W1 – Site 4															
Water	0	342	1,025	0	438	1,314	0	265	795	0	567	1,700	0	603	1,809
Amides or nitrogenous compounds	86	19	56	73	19	57	545	27	82	22	10	29	24	10	31
Alcohols	668	146	437	383	99	298	1,089	55	164	81	36	107			
Acrylic acid polymers	0	522	1,566	0	371	1,113				0	39	118	0	39	118
Acrylic acid polymers	0	21	64	0	39	116				0	36	107	0	38	115
Ethylene glycol ethers	212	46	139	127	33	99				149	66	197	154	66	199
Resins	0	35	105	0	35	106	0	105	314						
Acrylic acid polymers							0	311	933	0	267	801	0	269	806
Organic acids or salts							0	37	112	0	49	147	0	36	107
Alcohols	34	8	23	20	5	15									
Hydrocarbons - high molecular weight	126	28	83	68	18	53									
Pigments - organometallic	0	108	325							0	223	670			
Pigments - organic	0	26	77												
Pigments - organometallic				0	195	585									
Pigments - organic				0	47	142									
Pigments - inorganic							0	467	1,400						
Ethylene glycol ethers										0	8	25			
Pigments - organic													0	239	716
Additive: Ethoxylated tetramethyldecyldiol							0	33	100						

Table 3-F.1 Occupational Exposure Results, Scenario II (Press Room)^a (continued)

Chemical category (<i>additives in italics</i>)	Blue			Green			White			Cyan			Magenta		
	Inhalation exposure (mg/day)	Dermal exposure (mg/day)		Inhalation exposure (mg/day)	Dermal exposure (mg/day)		Inhalation exposure (mg/day)	Dermal exposure (mg/day)		Inhalation exposure (mg/day)	Dermal exposure (mg/day)		Inhalation exposure (mg/day)	Dermal exposure (mg/day)	
		min.	max.		min.	max.		min.	max.		min.	max.		min.	max.
Water-based Ink #W2 – Site 1															
Water	0	687	2,062	0	731	2,192	0	463	1,390	0	686	2,057	0	523	1,569
Acrylic acid polymers	0	64	192	0	101	302	0	355	1,066				0	188	564
Amides or nitrogenous compounds	11	3	8	21	7	21	616	34	102				16	20	60
Hydrocarbons - high molecular weight	10	3	8	13	4	13	102	6	17				4	5	15
Ethylene glycol ethers	0	25	75	0	45	134				0	36	108	0	50	150
Resins	0	98	294	0	60	181				0	180	541			
Ethylene glycol ethers	0	4	12	0	6	18							0	11	34
Resins	0	125	376	0	223	670							0	251	752
Hydrocarbons - low molecular weight	5	1	4	7	2	7							2	2	7
Pigments - organometallic	0	147	441							0	361	1,082			
Pigments - organic	0	28	85										0	226	679
Hydrocarbons - high molecular weight	2	1	2												
Inorganics	0	5	16												
Pigments - organic	0	37	111												
Pigments - organic				0	121	362									
Pigments-inorganic							0	410	1,231						
Alcohols							256	14	42						
Ethylene glycol ethers							256	14	42						
Additive: <i>Isobutanol</i>	4	1	3							9	11	33	9	11	34
Additive: <i>Ethyl carbitol</i>	4	1	3							9	11	33	9	11	34
Additive: <i>Propanol</i>	284	70	209				63	3	10						
Additive: <i>Ammonia</i>										13	15	45			

Table 3-F.1 Occupational Exposure Results, Scenario II (Press Room)^a (continued)

Chemical category (<i>additives in italics</i>)	Blue			Green			White			Cyan			Magenta		
	Inhalation exposure (mg/day)	Dermal exposure (mg/day)		Inhalation exposure (mg/day)	Dermal exposure (mg/day)		Inhalation exposure (mg/day)	Dermal exposure (mg/day)		Inhalation exposure (mg/day)	Dermal exposure (mg/day)		Inhalation exposure (mg/day)	Dermal exposure (mg/day)	
		min.	max.		min.	max.		min.	max.		min.	max.		min.	max.
Water-based Ink #W3 – Site 2															
Water	0	952	2,855	0	831	2,492	0	618	1,853	0	750	2,251	0	884	2,653
Acrylic acid polymers	0	131	393	0	183	548	0	187	561	0	299	896	0	202	606
Amides or nitrogenous compounds	140	21	63	187	28	85	307	19	56	108	38	113	115	26	78
Acrylic acid polymers	0	45	135	0	85	255	0	64	193	0	65	195	0	75	224
Olefin polymers	0	6	17	0	8	24	0	10	31	0	16	48	0	11	32
Siloxanes	0	6	19	0	5	16	0	8	25	0	11	34	0	9	27
Organic acids or salts	0	1	3	0	2	5	0	2	6	0	2	7	0	2	5
Ethylene glycol ethers	0	9	26				0	13	40	0	14	41	0	11	32
Propylene glycol ethers										16	6	17	18	4	12
Alcohols										0	5	14	0	1	2
Pigments - organic	0	98	294												
Alcohols				86	13	39									
Ethylene glycol ethers				42	6	19									
Pigments - organic				0	28	84									
Pigments - organometallic				0	99	298									
Pigments - inorganic							0	357	1,072						
Alcohols							85	5	15						
Pigments - organometallic										0	90	270			
Pigments - organometallic													0	71	214
Additive: Ammonia	10	2	5	6	1	3	11	1	2	13	5	14	13	3	9
Additive: Propanol	129	19	58	68	10	31	258	16	47				3	1	2
Additive: Isopropanol	2	0	1	ND	ND	ND	3	0	1				2	0	1
Additive: Polyfunctional aziridine	0	5	16												
Additive: Other components	ND	ND	ND												

Table 3-F.1 Occupational Exposure Results, Scenario II (Press Room) ^a (continued)

Chemical category (<i>additives in italics</i>)	Blue			Green			White			Cyan			Magenta		
	Inhalation exposure (mg/day)	Dermal exposure (mg/day)		Inhalation exposure (mg/day)	Dermal exposure (mg/day)		Inhalation exposure (mg/day)	Dermal exposure (mg/day)		Inhalation exposure (mg/day)	Dermal exposure (mg/day)		Inhalation exposure (mg/day)	Dermal exposure (mg/day)	
		min.	max.		min.	max.		min.	max.		min.	max.		min.	max.
Water-based Ink #W3 – Site 3															
Water	0	782	2,345	0	644	1,932	0	503	1,508	0	715	2,145	0	720	2,161
Acrylic acid polymers	0	178	535	0	262	785	0	197	592	0	315	944	0	274	822
Amides or nitrogenous compounds	99	28	85	185	40	121	435	19	58	52	40	119	33	35	105
Acrylic acid polymers	0	61	184	0	122	365	0	68	204	0	68	205	0	102	305
Olefin polymers	0	8	23	0	12	35	0	11	32	0	17	50	0	15	44
Siloxanes	0	9	26	0	8	23	0	9	26	0	12	36	0	12	37
Organic acids or salts	0	1	4	0	3	8	0	2	6	0	2	7	0	2	7
Ethylene glycol ethers	0	12	35				0	14	42	0	14	43	0	15	44
Propylene glycol ethers										8	6	18	5	6	17
Alcohols										0	5	14	0	1	3
Pigments - organic	0	134	401												
Alcohols				83	18	54									
Ethylene glycol ethers				42	9	27									
Pigments - organic				0	40	121									
Pigments - organometallic				0	143	428									
Pigments-inorganic							0	377	1,132						
Alcohols							121	5	16						
Pigments - organometallic										0	95	285			
Pigments - organometallic													0	97	291
Additive: Ammonia	83	24	71	2	0	1	135	6	18	14	11	33	14	15	45
Additive: Propanol	221	63	190				977	44	131						
Additive: Extenders							ND	ND	ND						
Additive: 2-Butoxyethanol													6	6	19

Table 3-F.1 Occupational Exposure Results, Scenario II (Press Room)^a (continued)

Chemical category (<i>additives in italics</i>)	Blue			Green			White			Cyan			Magenta		
	Inhalation exposure (mg/day)	Dermal exposure (mg/day)		Inhalation exposure (mg/day)	Dermal exposure (mg/day)		Inhalation exposure (mg/day)	Dermal exposure (mg/day)		Inhalation exposure (mg/day)	Dermal exposure (mg/day)		Inhalation exposure (mg/day)	Dermal exposure (mg/day)	
		min.	max.		min.	max.		min.	max.		min.	max.		min.	max.
Water-based Ink #W4 – Site 9A															
Water	0	678	2,035	0	527	1,582	0	395	1,185	0	659	1,978	0	728	2,185
Alcohols	73	42	125	34	20	61	335	24	73	117	58	174	48	36	107
Amides or nitrogenous compounds	9	5	16	9	5	15	84	6	18	14	7	21	16	12	36
Hydrocarbons - high molecular weight	9	5	16	9	5	15	84	6	18	8	4	13	8	6	18
Siloxanes	0	5	16	0	5	15	0	6	18	0	4	13	0	6	18
Alcohols	0	5	16	0	5	15	0	6	18	0	4	13	0	6	18
Acrylic acid polymers	0	130	390	0	127	381	0	152	456	0	105	314			
Amides or nitrogenous compounds	10	6	18	34	20	61				8	4	13	48	36	107
Resins	0	78	234	0	76	229				0	63	189			
Pigments - organometallic	0	182	545	0	20	61				0	147	440			
Alcohols				111	66	199	335	24	73				70	51	154
Propylene glycol ethers	73	42	125							0	60	180			
Propylene glycol ethers	73	42	125							110	55	164			
Pigments - inorganic				0	356	1,068	0	632	1,895						
Amides or nitrogenous compounds				9	5	15	84	6	18						
Pigments - organometallic	0	42	125												
Pigments - organic				0	36	107									
Pigments - organometallic				0	20	61									
Inorganics							0	43	128						
Alcohols										34	17	50			
Pigments - organometallic													0	208	624
Resins													0	208	624
Additive: Ammonia	10	6	18	8	5	14				12	6	18	4	3	8
Additive: Propanol	59	34	101							70	35	104			
Additive: Solids										0	71	214			
Additive: Ethyl carbitol										ND	ND	ND			
Additive: Petroleum distillate										ND	ND	ND			

Table 3-F.1 Occupational Exposure Results, Scenario II (Press Room) ^a (continued)

Chemical category (<i>additives in italics</i>)	Blue			Green			White			Cyan			Magenta		
	Inhalation exposure (mg/day)	Dermal exposure (mg/day)		Inhalation exposure (mg/day)	Dermal exposure (mg/day)		Inhalation exposure (mg/day)	Dermal exposure (mg/day)		Inhalation exposure (mg/day)	Dermal exposure (mg/day)		Inhalation exposure (mg/day)	Dermal exposure (mg/day)	
		min.	max.		min.	max.		min.	max.		min.	max.		min.	max.
UV-cured Ink #U1 – Site 11															
Acrylated polymers	0	209	626	0	204	612	0	125	375	0	209	626	0	209	626
Amides or nitrogenous compounds	22	10	31	24	10	31	137	9	26	8	10	31	8	10	31
Aromatic esters	105	49	146	113	48	143	638	40	119	39	49	146	38	49	146
Aromatic ketones	0	28	83	0	27	82	0	9	26	0	28	83	0	28	83
Olefin polymers	0	10	31	0	10	31	0	9	26	0	10	31	0	10	31
Siloxanes	0	10	31	0	10	31	0	9	26	0	10	31	0	10	31
Acrylated polymers	0	765	2,294	0	748	2,245				0	765	2,294	0	765	2,294
Aromatic ketones	0	10	31	0	10	31				0	10	31	0	10	31
Pigments - organic	0	209	626												
Pigments - organometallic				0	204	612									
Pigments - inorganic							0	454	1,362						
Acrylated polymers							0	284	852						
Acrylated polymers							0	170	511						
Pigments - inorganic							0	170	511						
Organophosphorous compounds							0	23	68						
Pigments - organometallic										0	209	626			
Pigments - organometallic													0	209	626
Additive: 1,6-Hexanediol diacrylate				66	28	83									

Table 3-F.1 Occupational Exposure Results, Scenario II (Press Room)^a (continued)

Chemical category (<i>additives in italics</i>)	Blue			Green			White			Cyan			Magenta		
	Inhalation exposure (mg/day)	Dermal exposure (mg/day)		Inhalation exposure (mg/day)	Dermal exposure (mg/day)		Inhalation exposure (mg/day)	Dermal exposure (mg/day)		Inhalation exposure (mg/day)	Dermal exposure (mg/day)		Inhalation exposure (mg/day)	Dermal exposure (mg/day)	
		min.	max.		min.	max.		min.	max.		min.	max.		min.	max.
UV-cured Ink #U2 – Site 6															
Acrylated polymers	0	347	1,041	0	280	839	0	91	274	0	369	1,108	0	225	675
Acrylated polyols	392	163	490	327	259	778	2,910	321	963	124	125	375	205	132	396
Acrylated polyols	281	117	351	92	73	218	1,181	130	391	141	142	425	161	104	312
Acrylated polyols	0	19	56	0	50	151	0	80	241	0	3	8	0	36	107
Alcohols	0	13	39	0	13	39	0	13	39	0	13	39	0	13	39
Aromatic ketones	0	39	117	0	39	117	0	39	117	0	39	116	0	39	117
Aromatic ketones	94	39	117	49	39	117	325	36	108	38	39	116	60	39	117
Aromatic ketones	0	39	117	0	39	117	0	20	59	0	39	116	0	39	117
Aromatic ketones	0	13	39	0	13	39	0	3	8	0	13	39	0	13	39
Olefin polymers	0	13	39	0	13	39	0	13	39	0	13	39	0	13	39
Acrylated polymers	0	147	441	0	160	479				0	141	424	0	191	573
Polyol derivatives	0	100	299	0	92	275				0	104	311	0	142	425
Acrylated polymers	0	60	179	0	55	165				0	62	187	0	104	312
Pigments - organometallic	0	136	408							0	200	599			
Pigments - organic	0	55	166												
Pigments - organometallic				0	136	407									
Pigments - organic				0	40	120									
Pigments - inorganic							0	521	1,564						
Organophosphorous compounds							0	33	98						
Pigments - organometallic													0	211	632

Table 3-F.1 Occupational Exposure Results, Scenario II (Press Room)^a (continued)

Chemical category (<i>additives in italics</i>)	Blue			Green			White			Cyan			Magenta		
	Inhalation exposure (mg/day)	Dermal exposure (mg/day)		Inhalation exposure (mg/day)	Dermal exposure (mg/day)		Inhalation exposure (mg/day)	Dermal exposure (mg/day)		Inhalation exposure (mg/day)	Dermal exposure (mg/day)		Inhalation exposure (mg/day)	Dermal exposure (mg/day)	
		min.	max.		min.	max.		min.	max.		min.	max.		min.	max.
UV-cured Ink #U3 – Site 8															
Acrylated polymers	0	765	2,294	0	765	2,294	0	419	1,258	0	765	2,294	0	765	2,294
Aromatic esters	44	49	146	41	49	146	380	42	126	32	49	146	26	49	146
Amides or nitrogeous compounds	9	10	31	9	10	31	81	9	27	7	10	31	6	10	31
Siloxanes	0	10	31	0	10	31	0	9	27	0	10	31	0	10	31
Olefin polymers	0	10	31	0	10	31	0	9	27	0	10	31	0	10	31
Aromatic ketones	0	10	31	0	10	31	0	9	27	0	10	31	0	10	31
Acrylated polyols	187	209	626	177	209	626				136	209	626	111	209	626
Aromatic ketones	0	28	83	0	28	83				0	28	83	0	28	83
Pigments - organic	0	209	626												
Pigments - organometallic				0	209	626									
Pigments - inorganic							0	509	1,528						
Acrylated polymers							0	180	539						
Acrylated polymers							0	90	270						
Organophosphorous compounds							0	24	72						
Pigments - organic										0	209	626			
Pigments - organometallic													0	209	626

^a Shaded areas indicate where data are not applicable (i.e., the chemical category was not found in the particular color and formulation).

^b No data or information available.

Table 3-F.2 Occupational Exposure Results, Scenario I (Ink Preparation Room)^a

Chemical category	Blue			Green			White			Cyan			Magenta		
	Inhalation exposure (mg/day)	Dermal exposure (mg/day)		Inhalation exposure (mg/day)	Dermal exposure (mg/day)		Inhalation exposure (mg/day)	Dermal exposure (mg/day)		Inhalation exposure (mg/day)	Dermal exposure (mg/day)		Inhalation exposure (mg/day)	Dermal exposure (mg/day)	
		min.	max.		min.	max.		min.	max.		min.	max.		min.	max.
Solvent-based Ink #S1															
Alcohols	2	78	234	1	52	156	0	21	64	1	26	78	1	39	117
Polyol derivatives	0	104	312	0	104	312	0	11	32	0	65	195	0	65	195
Resins	0	91	273	0	39	117	0	75	224	0	117	351	0	117	351
Water	0	5	16	0	7	20	0	2	6	0	3	8	0	4	12
Alcohols	13	494	1,482	9	390	1,170	7	277	831				7	273	819
Alkyl acetates	4	195	585	3	156	468	1	53	160				2	104	312
Resins	0	9	27	0	13	39				0	10	31	0	9	27
Pigments-organometallic	0	104	312	0	52	156				0	208	624			
Alcohols				4	286	858				12	702	2,106	6	403	1,209
Alkyl acetates				0	52	156				1	104	312	0	39	117
Propylene glycol ethers				0	52	156				0	65	195	0	78	234
Resins	0	91	273				0	117	352						
Organotitanium compounds	0	13	39				0	6	19						
Alkyl acetates	0	9	27				1	21	64						
Organic acids or salts	0	1	4				0	2	6						
Pigments-organometallic	0	65	195												
Aromatic esters	0	39	117												
Organic acids or salts	0	1	4												
Inorganics				0	7	20									
Pigments-organic				0	91	273									
Pigments-inorganic															
Hydrocarbons - low molecular weight							30	245	735						
Hydrocarbons - high molecular weight							0	11	32						
Inorganics													0	39	117
Pigments-organometallic													0	117	351
Pigments-organometallic													0	13	39

Table 3-F.2 Occupational Exposure Results, Scenario I (Ink Preparation Room) ^a (continued)

Chemical category	Blue			Green			White			Cyan			Magenta		
	Inhalation exposure (mg/day)	Dermal exposure (mg/day)		Inhalation exposure (mg/day)	Dermal exposure (mg/day)		Inhalation exposure (mg/day)	Dermal exposure (mg/day)		Inhalation exposure (mg/day)	Dermal exposure (mg/day)		Inhalation exposure (mg/day)	Dermal exposure (mg/day)	
		min.	max.		min.	max.		min.	max.		min.	max.		min.	max.
Solvent-based Ink #S2															
Alcohols	11	328	983	10	345	1,036	6	219	657	11	335	1,006	10	325	975
Alkyl acetates	3	107	321	2	84	252	0	3	8	3	125	374	2	97	292
Hydrocarbons - low molecular weight	2	123	370	3	144	432	3	180	539	2	101	304	4	214	641
Alcohols	2	74	223	2	66	199	1	37	111	2	71	212	3	118	353
Resins	0	329	986	0	304	913	0	294	882	0	329	987	0	209	626
Hydrocarbons - low molecular weight	1	6	19	1	4	11	1	8	23	1	6	19	1	8	23
Siloxanes	0	13	38	0	13	38	0	13	38	0	13	39	0	13	38
Amides or nitrogeneous compounds	0	13	38	0	13	38	0	13	38	0	13	39	0	13	38
Organic acids or salts	0	13	38	0	13	38	0	13	38	0	13	39	0	13	38
Alcohols	1	76	227	1	69	207				1	64	193	1	70	209
Polyol derivatives	0	47	140	0	24	71				0	44	131	0	33	99
Amides or nitrogeneous compounds	0	13	38	0	13	38				0	13	39	0	13	38
Organophosphorous compounds	0	13	38	0	13	38				0	13	39	0	13	38
Pigments-organometallic	0	94	283	0	23	68				0	161	482			
Pigments-inorganic				0	103	308	0	522	1,566						
Pigments-organometallic	0	53	159												
Pigments-organic				0	50	150									
Pigments-organometallic				0	22	66									
Pigments-inorganic													0	164	493

Table 3-F.2 Occupational Exposure Results, Scenario I (Ink Preparation Room) ^a (continued)

Chemical category	Blue			Green			White			Cyan			Magenta		
	Inhalation exposure (mg/day)	Dermal exposure (mg/day)		Inhalation exposure (mg/day)	Dermal exposure (mg/day)		Inhalation exposure (mg/day)	Dermal exposure (mg/day)		Inhalation exposure (mg/day)	Dermal exposure (mg/day)		Inhalation exposure (mg/day)	Dermal exposure (mg/day)	
		min.	max.		min.	max.		min.	max.		min.	max.		min.	max.
Water-based Ink #W1															
Water	0	326	979	0	424	1,273	0	254	761	0	551	1,652	0	588	1,765
Amides or nitrogenous compounds	15	20	59	12	19	58	22	29	86	5	10	29	5	10	31
Alcohols	1	130	390	1	94	281	1	57	172	0	37	110			
Acrylic acid polymers	0	542	1,626	0	381	1,142				0	40	121	0	40	121
Acrylic acid polymers	0	22	66	0	40	119				0	37	110	0	39	117
Ethylene glycol ethers	0	48	144	0	34	101				0	67	201	0	68	203
Resins	0	36	109	0	36	109	0	109	328						
Acrylic acid polymers							0	325	975	0	273	818	0	274	823
Organic acids or salts							0	39	117	0	50	150	0	36	109
Alcohols	0	8	23	0	5	16									
Hydrocarbons-high molecular weight	0	29	86	0	18	55									
Pigments-organometallic	0	112	337							0	228	685			
Pigments-organic	0	27	80												
Pigments-organometallic				0	200	600									
Pigments-organic				0	49	146									
Pigments-inorganic							0	488	1,463						
Ethylene glycol ethers										0	9	26			
Pigments-organic													0	244	731

Table 3-F.2 Occupational Exposure Results, Scenario I (Ink Preparation Room) ^a (continued)

Chemical category	Blue			Green			White			Cyan			Magenta		
	Inhalation exposure (mg/day)	Dermal exposure (mg/day)		Inhalation exposure (mg/day)	Dermal exposure (mg/day)		Inhalation exposure (mg/day)	Dermal exposure (mg/day)		Inhalation exposure (mg/day)	Dermal exposure (mg/day)		Inhalation exposure (mg/day)	Dermal exposure (mg/day)	
		min.	max.		min.	max.		min.	max.		min.	max.		min.	max.
Water-based Ink #W2															
Water	0	721	2,162	0	666	1,999	0	455	1,365	0	706	2,117	0	539	1,617
Acrylic acid polymers	0	48	144	0	112	337	0	371	1,113				0	194	581
Amides or nitrogenous compounds	1	3	8	3	5	14	7	10	31				3	5	14
Hydrocarbons-high molecular weight	0	3	8	0	5	15	0	6	18				0	5	15
Ethylene glycol ethers	0	26	79	0	50	150				0	37	111	0	52	155
Resins	0	113	339	0	67	202				0	186	557			
Ethylene glycol ethers	0	3	9	0	7	20							0	12	35
Resins	0	131	393	0	250	750							0	258	775
Hydrocarbons-low molecular weight	0	1	4	0	2	7							0	3	8
Pigments-organometallic	0	170	509							0	371	1,114			
Pigments-organic	0	33	98										0	233	700
Hydrocarbons-high molecular weight	0	1	2												
Inorganics	0	6	19												
Pigments-organic	0	43	128												
Pigments-organic				0	135	405									
Pigments-inorganic							0	428	1,285						
Alcohols							0	15	44						
Ethylene glycol ethers							0	15	44						

Table 3-F.2 Occupational Exposure Results, Scenario I (Ink Preparation Room) ^a (continued)

Chemical category	Blue			Green			White			Cyan			Magenta		
	Inhalation exposure (mg/day)	Dermal exposure (mg/day)		Inhalation exposure (mg/day)	Dermal exposure (mg/day)		Inhalation exposure (mg/day)	Dermal exposure (mg/day)		Inhalation exposure (mg/day)	Dermal exposure (mg/day)		Inhalation exposure (mg/day)	Dermal exposure (mg/day)	
		min.	max.		min.	max.		min.	max.		min.	max.		min.	max.
Water-based Ink #W3															
Water	0	725	2,174	0	642	1,927	0	452	1,357	0	667	2,002	0	657	1,970
Acrylic acid polymers	0	238	714	0	263	788	0	238	714	0	347	1,041	0	316	948
Amides or nitrogenous compounds	15	38	113	18	40	121	12	23	70	19	44	131	18	40	121
Acrylic acid polymers	0	82	246	0	122	367	0	82	246	0	75	226	0	117	351
Olefin polymers	0	10	31	0	12	35	0	13	39	0	19	56	0	17	51
Siloxanes	0	12	35	0	8	23	0	10	31	0	13	40	0	14	43
Organic acids or salts	0	2	6	0	3	8	0	3	8	0	3	8	0	3	8
Ethylene glycol ethers	0	16	47				0	17	51	0	16	48	0	17	51
Propylene glycol ethers										0	7	20	0	7	20
Alcohols										0	5	16	0	1	4
Pigments-organic	0	178	534												
Alcohols				0	18	55									
Ethylene glycol ethers				0	9	27									
Pigments-organic				0	40	121									
Pigments-organometallic				0	143	429									
Pigments-inorganic							0	455	1,365						
Alcohols							0	7	20						
Pigments-organometallic										0	105	314			
Pigments-organometallic													0	112	335

Table 3-F.2 Occupational Exposure Results, Scenario I (Ink Preparation Room) ^a (continued)

Chemical category	Blue			Green			White			Cyan			Magenta		
	Inhalation exposure (mg/day)	Dermal exposure (mg/day)		Inhalation exposure (mg/day)	Dermal exposure (mg/day)		Inhalation exposure (mg/day)	Dermal exposure (mg/day)		Inhalation exposure (mg/day)	Dermal exposure (mg/day)		Inhalation exposure (mg/day)	Dermal exposure (mg/day)	
		min.	max.		min.	max.		min.	max.		min.	max.		min.	max.
Water-based Ink #W4															
Water	0	613	1,840	0	460	1,381	0	423	1,268	0	591	1,773	0	694	2,083
Alcohols	0	49	147	0	23	69	0	26	78	0	53	158	0	44	133
Amides or nitrogenous compounds	0	6	18	0	6	17	0	7	20	0	7	20	0	13	38
Hydrocarbons-high molecular weight	0	6	18	0	6	17	0	7	20	0	7	20	0	6	19
Siloxanes	0	6	18	0	6	17	0	7	20	0	7	20	0	6	19
Alcohols	0	6	18	0	6	17	0	7	20	0	7	20	0	6	19
Acrylic acid polymers	0	153	460	0	144	431	0	163	488	0	164	492			
Amides or nitrogenous compounds	0	6	18	0	23	69				0	7	20	0	44	133
Resins	0	92	276	0	86	259				0	98	295			
Pigments-organometallic	0	215	644	0	23	69				0	230	689			
Alcohols				0	46	138	0	26	78				0	44	133
Propylene glycol ethers	0	49	147							0	53	158			
Propylene glycol ethers	0	49	147							0	53	158			
Pigments-inorganic				0	403	1,208	0	585	1,755						
Amides or nitrogenous compounds				3	6	17	3	7	20						
Pigments-organometallic	0	49	147												
Pigments-organic				0	40	121									
Pigments-organometallic				0	23	69									
Inorganics							0	46	137						
Alcohols										0	26	79			
Pigments-organometallic													0	221	663
Resins													0	221	663

Table 3-F.2 Occupational Exposure Results, Scenario I (Ink Preparation Room) ^a (continued)

Chemical category	Blue			Green			White			Cyan			Magenta		
	Inhalation exposure (mg/day)	Dermal exposure (mg/day)		Inhalation exposure (mg/day)	Dermal exposure (mg/day)		Inhalation exposure (mg/day)	Dermal exposure (mg/day)		Inhalation exposure (mg/day)	Dermal exposure (mg/day)		Inhalation exposure (mg/day)	Dermal exposure (mg/day)	
		min.	max.		min.	max.		min.	max.		min.	max.		min.	max.
UV-cured Ink #U1															
Acrylated polymers	0	209	626	0	209	626	0	125	375	0	209	626	0	209	626
Amides or nitrogenous compounds	0	10	31	0	10	31	0	9	26	0	10	31	0	10	31
Aromatic esters	0	49	146	0	49	146	0	40	119	0	49	146	0	49	146
Aromatic ketones	0	28	83	0	28	83	0	9	26	0	28	83	0	28	83
Olefin polymers	0	10	31	0	10	31	0	9	26	0	10	31	0	10	31
Siloxanes	0	10	31	0	10	31	0	9	26	0	10	31	0	10	31
Acrylated polymers	0	765	2,294	0	765	2,294				0	765	2,294	0	765	2,294
Aromatic ketones	0	10	31	0	10	31				0	10	31	0	10	31
Pigments-organic	0	209	626												
Pigments-organometallic				0	209	626									
Pigments-inorganic							0	454	1,362						
Acrylated polymers							0	284	852						
Acrylated polymers							0	170	511						
Pigments-inorganic							0	170	511						
Organophosphorous compounds							0	23	68						
Pigments-organometallic										0	209	626			
Pigments-organometallic													0	209	626

Table 3-F.2 Occupational Exposure Results, Scenario I (Ink Preparation Room) ^a (continued)

Chemical category	Blue			Green			White			Cyan			Magenta		
	Inhalation exposure (mg/day)	Dermal exposure (mg/day)		Inhalation exposure (mg/day)	Dermal exposure (mg/day)		Inhalation exposure (mg/day)	Dermal exposure (mg/day)		Inhalation exposure (mg/day)	Dermal exposure (mg/day)		Inhalation exposure (mg/day)	Dermal exposure (mg/day)	
		min.	max.		min.	max.		min.	max.		min.	max.		min.	max.
UV-cured Ink #U2															
Acrylated polymers	0	347	1,041	0	280	839	0	91	274	0	369	1,108	0	225	675
Acrylated polyols	0	163	490	0	259	778	0	321	963	0	125	375	0	132	396
Acrylated polyols	0	117	351	0	73	218	0	130	391	0	142	425	0	104	312
Acrylated polyols	0	19	56	0	50	151	0	80	241	0	3	8	0	36	107
Alcohols	0	13	39	0	13	39	0	13	39	0	13	39	0	13	39
Aromatic ketones	0	39	117	0	39	117	0	39	117	0	39	116	0	39	117
Aromatic ketones	0	39	117	0	39	117	0	36	108	0	39	116	0	39	117
Aromatic ketones	0	39	117	0	39	117	0	20	59	0	39	116	0	39	117
Aromatic ketones	0	13	39	0	13	39	0	3	8	0	13	39	0	13	39
Olefin polymers	0	13	39	0	13	39	0	13	39	0	13	39	0	13	39
Acrylated polymers	0	147	441	0	160	479				0	141	424	0	191	573
Polyol derivatives	0	100	299	0	92	275				0	104	311	0	142	425
Acrylated polymers	0	60	179	0	55	165				0	62	187	0	104	312
Pigments-organometallic	0	136	408							0	200	599			
Pigments-organic	0	55	166												
Pigments-organometallic				0	136	407									
Pigments-organic				0	40	120									
Pigments-inorganic							0	521	1,564						
Organophosphorous compounds							0	33	98						
Pigments-organometallic													0	211	632

Table 3-F.2 Occupational Exposure Results, Scenario I (Ink Preparation Room) ^a (continued)

Chemical category	Blue			Green			White			Cyan			Magenta		
	Inhalation exposure (mg/day)	Dermal exposure (mg/day)		Inhalation exposure (mg/day)	Dermal exposure (mg/day)		Inhalation exposure (mg/day)	Dermal exposure (mg/day)		Inhalation exposure (mg/day)	Dermal exposure (mg/day)		Inhalation exposure (mg/day)	Dermal exposure (mg/day)	
		min.	max.		min.	max.		min.	max.		min.	max.		min.	max.
UV-cured Ink #U3															
Acrylated polymers	0	765	2,294	0	765	2,294	0	419	1,258	0	765	2,294	0	765	2,294
Aromatic esters	0	49	146	0	49	146	0	42	126	0	49	146	0	49	146
Amides or nitrogeneous compounds	0	10	31	0	10	31	0	9	27	0	10	31	0	10	31
Siloxanes	0	10	31	0	10	31	0	9	27	0	10	31	0	10	31
Olefin polymers	0	10	31	0	10	31	0	9	27	0	10	31	0	10	31
Aromatic ketones	0	10	31	0	10	31	0	9	27	0	10	31	0	10	31
Acrylated polyols	0	209	626	0	209	626				0	209	626	0	209	626
Aromatic ketones	0	28	83	0	28	83				0	28	83	0	28	83
Pigments-organic	0	209	626												
Pigments-organometallic				0	209	626									
Pigments-inorganic							0	509	1,528						
Acrylated polymers							0	180	539						
Acrylated polymers							0	90	270						
Organophosphorous compounds							0	24	72						
Pigments-organic										0	209	626			
Pigments-organometallic													0	209	626

^a Shaded areas indicate where data are not applicable (i.e., the chemical category was not found in the particular color and formulation).

Appendix 3-I (Risk Chapter)

Systemic Toxicity

Risk Results

Formulation	SAT hazard level ^d	Occupational				General population	
		Dermal		Inhalation		Inhalation	
		Margin of Exposure ^{a,b}	Concern level ^c	Margin of Exposure ^{a,b}	Concern level	Margin of Exposure ^{a,b}	Concern level
Solvent-based Ink #S1 – Site 9B							
BLUE							
Alcohols		476	possible	87.5	possible	4.3x10 ⁵	low or negligible
Alkyl acetates	LM						
Pigments - organometallic		1695	low or negligible		no exposure		no exposure
Polyol derivatives	LM				no exposure		no exposure
Resins	LM				no exposure		no exposure
Resins	L				no exposure		no exposure
Alcohols		59.2	clear	0.1	clear	313	low or negligible
Pigments - organometallic	LM				no exposure		no exposure
Aromatic esters		180	low or negligible		no exposure		no exposure
Organotitanium compounds	M				no exposure		no exposure
Alkyl acetates		0.34 (HQ)	low or negligible	1060	low or negligible	5.1x10 ⁶	low or negligible
Resins	L				no exposure		no exposure
Water							
Organic acids or salts	LM				no exposure		no exposure
Organic acids or salts		1.5 x10 ⁴	low or negligible		no exposure		no exposure
Alcohols		6.22	clear	4.67	clear	2.3x10 ⁴	low or negligible
GREEN							
Alcohols		708	possible	103	low or negligible	5.0x10 ⁵	low or negligible
Alcohols		2.52	clear	1.5	clear	7301	low or negligible
Alkyl acetates	LM						
Polyol derivatives	LM				no exposure		no exposure
Pigments - organic	LM				no exposure		no exposure
Pigments - organometallic		3974	low or negligible		no exposure		no exposure
Alkyl acetates		39.7	clear	28.7	clear	1.4x10 ⁵	low or negligible
Alcohols		104	possible	0.1	clear	4371	low or negligible
Propylene glycol ethers		2.16 (HQ)	possible	3.7 (HQ)	possible	7.5x10 ⁻⁵ (HQ)	low or negligible
Resins	L				no exposure		no exposure
Resins	L				no exposure		no exposure

Formulation	SAT hazard level ^d	Occupational				General population	
		Dermal		Inhalation		Inhalation	
		Margin of Exposure ^{a,b}	Concern level ^c	Margin of Exposure ^{a,b}	Concern level	Margin of Exposure ^{a,b}	Concern level
Inorganics		5.3 x10 ⁴	low or negligible		no exposure		no exposure
Water							
WHITE							
Pigments - inorganic		3.23 (HQ)	possible		no exposure ^e		no exposure
Alcohols		684	possible	15.9	possible	7.8x10 ⁴	low or negligible
Hydrocarbons - low molecular weight	LM						
Resins	LM				no exposure		no exposure
Resins	L				no exposure		no exposure
Alkyl acetates	LM						
Alkyl acetates		1.00 (HQ)	possible	46	clear	2.2x10 ⁵	low or negligible
Alcohols		174	possible	0.024	clear	117	low or negligible
Hydrocarbons - high molecular weight	LM				no exposure		no exposure
Polyol derivatives	LM				no exposure		no exposure
Organotitanium compounds	M				no exposure		no exposure
Organic acids or salts		7167	low or negligible		no exposure		no exposure
Water							
Alcohols		98.3	clear	9.38	clear	4.5x10 ⁴	low or negligible
CYAN							
Alcohols		1.74	clear	1.29	clear	6226	low or negligible
Pigments - organometallic		830	low or negligible		no exposure		no exposure
Resins	L				no exposure		no exposure
Alkyl acetates		16.6	clear	14.9	clear	7.3x10 ⁴	low or negligible
Propylene glycol ethers		3.23 (HQ)	possible	4.4 (HQ)	possible	9.1x10 ⁻⁵ (HQ)	low or negligible
Polyol derivatives	LM				no exposure		no exposure
Alcohols		174	possible	0.19	clear	904	low or negligible
Resins	L				no exposure		no exposure
Water							
Alkyl acetates	LM						
MAGENTA							
Alcohols		1.97	clear	1.41	clear	6790	low or negligible
Alcohols		1322	low or negligible	231	low or negligible	1.1x10 ⁶	low or negligible
Pigments - organometallic	LM				no exposure		no exposure
Resins	L				no exposure		no exposure
Alkyl acetates	LM						

Formulation	SAT hazard level ^d	Occupational				General population	
		Dermal		Inhalation		Inhalation	
		Margin of Exposure ^{a,b}	Concern level ^c	Margin of Exposure ^{a,b}	Concern level	Margin of Exposure ^{a,b}	Concern level
Propylene glycol ethers		2.47 (HQ)	possible	3.5 (HQ)	possible	7.2x10 ⁻⁵ (HQ)	low or negligible
Polyol derivatives	LM				no exposure		no exposure
Alkyl acetates		69.4	clear	60	clear	2.9x10 ⁵	low or negligible
Alcohols		139	possible	0.14	clear	697	low or negligible
Inorganics		124 (HQ)	clear		no exposure		no exposure
Pigments - organometallic	LM				no exposure		no exposure
Resins	L				no exposure		no exposure
Water							
Trade Secret							
Propylene glycol ethers		28	possible	24.3	possible	1.2x10 ⁵	low or negligible
Solvent-based Ink #S2 – Site 5							
BLUE							
Alcohols		385	possible	29.6	possible	1.4x10 ⁵	low or negligible
Resins	L				no exposure		no exposure
Hydrocarbons - low molecular weight		233	low or negligible	41.4	clear	2.0x10 ⁵	low or negligible
Alkyl acetates	LM						
Alcohols		21.7	clear	6.82	clear	3.3x10 ⁴	low or negligible
Alcohols		60.6	clear	0.028	clear	134	low or negligible
Pigments - organometallic		1824	low or negligible		no exposure		no exposure
Pigments - organometallic	LM				no exposure		no exposure
Polyol derivatives	LM				no exposure		no exposure
Amides or nitrogenous compounds	L				no exposure		no exposure
Organic acids or salts		1469	low or negligible		no exposure		no exposure
Siloxanes		456	possible		no exposure		no exposure
Amides or nitrogenous compounds	LM				no exposure		no exposure
Organophosphorus compounds		310	possible		no exposure		no exposure
Hydrocarbons - low molecular weight	LM						
GREEN							
Alcohols		452	possible	30.9	possible	1.5x10 ⁵	low or negligible
Resins	L				no exposure		no exposure
Hydrocarbons - low molecular weight		177	low or negligible	27.9	clear	1.4x10 ⁵	low or negligible
Alkyl acetates	LM						
Pigments - inorganic		0.67 (HQ)	low or negligible		no exposure		no exposure

Formulation	SAT hazard level ^d	Occupational				General population	
		Dermal		Inhalation		Inhalation	
		Margin of Exposure ^{a,b}	Concern level ^c	Margin of Exposure ^{a,b}	Concern level	Margin of Exposure ^{a,b}	Concern level
Alcohols		21.1	clear	5.89	clear	2.8x10 ⁴	low or negligible
Alcohols		60.2	clear	0.024	clear	118	low or negligible
Pigments - organic	LM				no exposure		no exposure
Polyol derivatives	LM				no exposure		no exposure
Pigments - organometallic		6764	low or negligible		no exposure		no exposure
Pigments - organometallic		3190	low or negligible		no exposure		no exposure
Amides or nitrogenous compounds	L				no exposure		no exposure
Organic acids or salts		1308	low or negligible		no exposure		no exposure
Siloxanes		406	possible		no exposure		no exposure
Amides or nitrogenous compounds	LM				no exposure		no exposure
Organophosphorus compounds		276	possible		no exposure		no exposure
Hydrocarbons - low molecular weight	LM						
WHITE							
Pigments - inorganic		3.37 (HQ)	possible		no exposure		no exposure
Resins	L				no exposure		no exposure
Alcohols		602	possible	15.3	possible	7.4x10 ⁴	low or negligible
Hydrocarbons - low molecular weight		144	low or negligible	8.43	clear	4.1x10 ⁴	low or negligible
Alcohols		110	possible	0.017	clear	80	possible
Amides or nitrogenous compounds	L				no exposure		no exposure
Organic acids or salts		1306	low or negligible		no exposure		no exposure
Siloxanes		405	possible		no exposure		no exposure
Hydrocarbons - low molecular weight	LM						
Alkyl acetates	LM						
CYAN							
Alcohols		421	possible	22.1	possible	1.1x10 ⁵	low or negligible
Hydrocarbons - low molecular weight		265	low or negligible	32.2	clear	1.6x10 ⁵	low or negligible
Resins	L				no exposure		no exposure
Pigments - organometallic		1003	low or negligible		no exposure		no exposure
Alcohols		59.7	clear	0.019	clear	90	possible
Alkyl acetates	LM						
Alcohols		23.9	clear	5.14	clear	2.5x10 ⁴	low or negligible
Amides or nitrogenous compounds	L				no exposure		no exposure

Formulation	SAT hazard level ^d	Occupational				General population	
		Dermal		Inhalation		Inhalation	
		Margin of Exposure ^{a,b}	Concern level ^c	Margin of Exposure ^{a,b}	Concern level	Margin of Exposure ^{a,b}	Concern level
Organic acids or salts		1347	low or negligible		no exposure		no exposure
Siloxanes		418	possible		no exposure		no exposure
Amides or nitrogenous compounds	LM				no exposure		no exposure
Polyol derivatives	LM				no exposure		no exposure
Hydrocarbons - low molecular weight	LM						
Organophosphorus compounds		284	possible		no exposure		no exposure
MAGENTA							
Alcohols		482	possible	32.7	possible	1.6x10 ⁵	low or negligible
Hydrocarbons - low molecular weight		118	low or negligible	18.5	clear	8.9x10 ⁴	low or negligible
Resins	L				no exposure		no exposure
Pigments - organometallic	LM				no exposure		no exposure
Alcohols		33.6	clear	0.014	clear	65	possible
Alkyl acetates	LM						
Alcohols		20.7	clear	5.73	clear	2.8x10 ⁴	low or negligible
Amides or nitrogenous compounds	L				no exposure		no exposure
Organic acids or salts		1285	low or negligible		no exposure		no exposure
Siloxanes		398	possible		no exposure		no exposure
Amides or nitrogenous compounds	LM				no exposure		no exposure
Polyol derivatives	LM				no exposure		no exposure
Hydrocarbons - low molecular weight	LM						
Organophosphorus compounds		271	possible		no exposure		no exposure
Solvent-based Ink #S2 – Site 7							
BLUE							
Alcohols		978	possible	69.8	possible	3.4x10 ⁵	low or negligible
Resins	L				no exposure		no exposure
Hydrocarbons - low molecular weight		325	low or negligible	53.6	clear	2.6x10 ⁵	low or negligible
Alkyl acetates	LM						
Alcohols		2.79	clear	0.81	clear	3938	low or negligible
Alcohols		84.4	clear	0.036	clear	174	low or negligible
Pigments - organometallic		2542	low or negligible		no exposure		no exposure
Pigments - organometallic	LM				no exposure		no exposure
Polyol derivatives	LM				no exposure		no exposure

Formulation	SAT hazard level ^d	Occupational				General population	
		Dermal		Inhalation		Inhalation	
		Margin of Exposure ^{a,b}	Concern level ^c	Margin of Exposure ^{a,b}	Concern level	Margin of Exposure ^{a,b}	Concern level
Amides or nitrogenous compounds	L				no exposure		no exposure
Organic acids or salts		2048	low or negligible		no exposure		no exposure
Siloxanes		635	possible		no exposure		no exposure
Amides or nitrogenous compounds	LM				no exposure		no exposure
Organophosphorus compounds		432	possible		no exposure		no exposure
Hydrocarbons - low molecular weight	LM						
GREEN							
Alcohols		976	possible	71.1	possible	3.5x10 ⁵	low or negligible
Resins	L				no exposure		no exposure
Hydrocarbons - low molecular weight		292	low or negligible	49.4	clear	2.4x10 ⁵	low or negligible
Alkyl acetates	LM						
Pigments - inorganic		0.41 (HQ)	low or negligible		no exposure		no exposure
Alcohols		2.66	clear	0.79	clear	3828	low or negligible
Alcohols		99.4	clear	0.043	clear	209	low or negligible
Pigments - organic	LM				no exposure		no exposure
Polyol derivatives	LM				no exposure		no exposure
Pigments - organometallic		1.1 x10 ⁴	low or negligible		no exposure		no exposure
Pigments - organometallic		5288	low or negligible		no exposure		no exposure
Amides, tallow, hydrogenated	L				no exposure		no exposure
Organic acids or salts		2172	low or negligible		no exposure		no exposure
Siloxanes		673	possible		no exposure		no exposure
Amides or nitrogenous compounds	LM				no exposure		no exposure
Organophosphorus compounds		458	possible		no exposure		no exposure
Hydrocarbons - low molecular weight	LM						
WHITE							
Pigments - inorganic		2.53 (HQ)	possible		no exposure		no exposure
Resins	L				no exposure		no exposure
Alcohols		1252	low or negligible	36.7	possible	1.8x10 ⁵	low or negligible
Hydrocarbons - low molecular weight		191	low or negligible	13	clear	6.3x10 ⁴	low or negligible
Alcohols		145	possible	0.025	clear	123	low or negligible
Amides or nitrogenous compounds	L				no exposure		no exposure

Formulation	SAT hazard level ^d	Occupational				General population	
		Dermal		Inhalation		Inhalation	
		Margin of Exposure ^{a,b}	Concern level ^c	Margin of Exposure ^{a,b}	Concern level	Margin of Exposure ^{a,b}	Concern level
Organic acids or salts		1739	low or negligible		no exposure		no exposure
Siloxanes		539	possible		no exposure		no exposure
Hydrocarbons - low molecular weight	LM						
Alkyl acetates	LM						
Alcohols		4.02	clear	0.48	clear	2327	low or negligible
CYAN							
Alcohols		956	possible	82.3	possible	4.0x10 ⁵	low or negligible
Hydrocarbons - low molecular weight		395	low or negligible	78.6	clear	3.8x10 ⁵	low or negligible
Resins	L				no exposure		no exposure
Pigments - organometallic		1496	low or negligible		no exposure		no exposure
Alcohols		89.2	clear	0.046	clear	221	low or negligible
Alkyl acetates	LM						
Alcohols		2.83	clear	0.99	clear	4825	low or negligible
Amides, tallow, hydrogenated	L				no exposure		no exposure
Organic acids or salts		2009	low or negligible		no exposure		no exposure
Siloxanes		623	possible		no exposure		no exposure
Amides or nitrogenous compounds	LM				no exposure		no exposure
Polyol derivatives	LM				no exposure		no exposure
Hydrocarbons - low molecular weight	LM						
Organophosphorus compounds		424	possible		no exposure		no exposure
MAGENTA							
Alcohols		995	possible	67.4	possible	3.3x10 ⁵	low or negligible
Hydrocarbons - low molecular weight		189	low or negligible	29.6	clear	1.4x10 ⁵	low or negligible
Resins	L				no exposure		no exposure
Pigments - organometallic	LM				no exposure		no exposure
Alcohols		54	clear	0.022	clear	105	low or negligible
Alkyl acetates	LM						
Alcohols		2.77	clear	0.77	clear	3716	low or negligible
Amides, tallow, hydrogenated	L				no exposure		no exposure
Organic acids or salts		2061	low or negligible		no exposure		no exposure
Siloxanes		639	possible		no exposure		no exposure
Amides or nitrogenous compounds	LM				no exposure		no exposure

Formulation	SAT hazard level ^d	Occupational				General population	
		Dermal		Inhalation		Inhalation	
		Margin of Exposure ^{a,b}	Concern level ^c	Margin of Exposure ^{a,b}	Concern level	Margin of Exposure ^{a,b}	Concern level
Polyol derivatives	LM				no exposure		no exposure
Hydrocarbons - low molecular weight	LM						
Organophosphorus compounds		435	possible		no exposure		no exposure
Solvent-based Ink #S2 – Site 10							
BLUE							
Alcohols		1023	low or negligible	86.3	possible	4.2x10 ⁵	low or negligible
Resins	L				no exposure		no exposure
Hydrocarbons - low molecular weight		339	low or negligible	66.2	clear	3.2x10 ⁵	low or negligible
Alkyl acetates	LM						
Alcohols		2.38	clear	0.82	clear	3966	low or negligible
Alcohols		88.2	clear	0.044	clear	215	low or negligible
Pigments - organometallic		2655	low or negligible		no exposure		no exposure
Pigments - organometallic	LM				no exposure		no exposure
Polyol derivatives	LM				no exposure		no exposure
Amides, tallow, hydrogenated	L				no exposure		no exposure
Organic acids or salts		2143	low or negligible		no exposure		no exposure
Siloxanes		664	possible		no exposure		no exposure
Amides or nitrogenous compounds	LM				no exposure		no exposure
Organophosphorus compounds		452	possible		no exposure		no exposure
Hydrocarbons - low molecular weight	LM						
GREEN							
Alcohols		939	possible	69.6	possible	3.4x10 ⁵	low or negligible
Resins	L				no exposure		no exposure
Hydrocarbons - low molecular weight		282	low or negligible	48.4	clear	2.3x10 ⁵	low or negligible
Alkyl acetates	LM						
Pigments - inorganic		0.42 (HQ)	low or negligible		no exposure		no exposure
Alcohols		2.48	clear	0.75	clear	3634	low or negligible
Alcohols		95.7	clear	0.042	clear	205	low or negligible
Pigments - organic	LM				no exposure		no exposure
Polyol derivatives	LM				no exposure		no exposure
Pigments - organometallic		1.1 x10 ⁴	low or negligible		no exposure		no exposure
Pigments - organometallic		5093	low or negligible		no exposure		no exposure

Formulation	SAT hazard level ^d	Occupational				General population	
		Dermal		Inhalation		Inhalation	
		Margin of Exposure ^{a,b}	Concern level ^c	Margin of Exposure ^{a,b}	Concern level	Margin of Exposure ^{a,b}	Concern level
Amides, tallow, hydrogenated	L				no exposure		no exposure
Organic acids or salts		2087	low or negligible		no exposure		no exposure
Siloxanes		647	possible		no exposure		no exposure
Amides or nitrogenous compounds	LM				no exposure		no exposure
Organophosphorus compounds		440	possible		no exposure		no exposure
Hydrocarbons - low molecular weight	LM						
WHITE							
Pigments - inorganic		2.38 (HQ)	possible		no exposure		no exposure
Resins	L				no exposure		no exposure
Alcohols		1331	low or negligible	41.6	possible	2.0x10 ⁵	low or negligible
Hydrocarbons - low molecular weight		203	low or negligible	14.7	clear	7.1x10 ⁴	low or negligible
Alcohols		155	possible	0.029	clear	140	low or negligible
Amides, tallow, hydrogenated	L				no exposure		no exposure
Organic acids or salts		1848	low or negligible		no exposure		no exposure
Siloxanes		573	possible		no exposure		no exposure
Hydrocarbons - low molecular weight	LM						
Alkyl acetates	LM						
Alcohols		3.17	clear	0.41	clear	1964	low or negligible
CYAN							
Alcohols		1070	low or negligible	85.4	possible	4.2x10 ⁵	low or negligible
Hydrocarbons - low molecular weight		442	low or negligible	81.8	clear	3.9x10 ⁵	low or negligible
Resins	L				no exposure		no exposure
Pigments - organometallic		1676	low or negligible		no exposure		no exposure
Alcohols		99.4	clear	0.047	clear	228	low or negligible
Alkyl acetates	LM						
Alcohols		4.39	clear	1.43	clear	6933	low or negligible
Amides or nitrogenous compounds	L				no exposure		no exposure
Organic acids or salts		2247	low or negligible		no exposure		no exposure
Siloxanes		697	possible		no exposure		no exposure
Amides or nitrogenous compounds	LM				no exposure		no exposure
Polyol derivatives	LM				no exposure		no exposure
Hydrocarbons - low molecular weight	LM						

Formulation	SAT hazard level ^d	Occupational				General population	
		Dermal		Inhalation		Inhalation	
		Margin of Exposure ^{a,b}	Concern level ^c	Margin of Exposure ^{a,b}	Concern level	Margin of Exposure ^{a,b}	Concern level
Organophosphorus compounds		474	possible		no exposure		no exposure
Propylene glycol ethers		17 (HQ)	clear	53 (HQ)	clear		low or negligible
Propylene glycol ethers	LM						
MAGENTA							
Alcohols		1140	low or negligible	81.6	possible	4.0x10 ⁵	low or negligible
Hydrocarbons - low molecular weight		216	low or negligible	35.9	clear	1.7x10 ⁵	low or negligible
Resins	L				no exposure		no exposure
Pigments - organometallic	LM				no exposure		no exposure
Alcohols		61.8	clear	0.026	clear	127	low or negligible
Alkyl acetates	LM						
Alcohols		2.14	clear	0.63	clear	3028	low or negligible
Amides or nitrogenous compounds	L				no exposure		no exposure
Organic acids or salts		2363	low or negligible		no exposure		no exposure
Siloxanes		733	possible		no exposure		no exposure
Amides or nitrogenous compounds	LM				no exposure		no exposure
Polyol derivatives	LM				no exposure		no exposure
Hydrocarbons - low molecular weight	LM						
Organophosphorus compounds		498	possible		no exposure		no exposure
Propylene glycol ethers		3.36 (HQ)	possible	12 (HQ)	clear	2.4x10 ⁻⁴ (HQ)	low or negligible
Propylene glycol ethers	LM						
Water-based Ink #W1 – Site 4							
BLUE							
Acrylic acid polymers	LM				no exposure		no exposure
Pigments - organometallic		1293	low or negligible		no exposure		no exposure
Alcohols		9.14	clear	4.94	clear	1.8x10 ⁴	low or negligible
Water							
Pigments - organic	L				no exposure		no exposure
Ethylene glycol ethers		15.1	clear	1.25	clear	4586	low or negligible
Resins	L				no exposure		no exposure
Hydrocarbons - high molecular weight		339	possible	222	possible	1.2x10 ⁶	low or negligible
Acrylic acid polymers	LM				no exposure		no exposure
Amides or nitrogenous compounds		2.24	clear	43 (HQ)	clear	0.012 (HQ)	low or negligible

Formulation	SAT hazard level ^d	Occupational				General population	
		Dermal		Inhalation		Inhalation	
		Margin of Exposure ^{a,b}	Concern level ^c	Margin of Exposure ^{a,b}	Concern level	Margin of Exposure ^{a,b}	Concern level
Alcohols		488	possible	0.38	clear	1395	low or negligible
GREEN							
Pigments - organometallic		329	possible		no exposure		no exposure
Acrylic acid polymers	LM				no exposure		no exposure
Pigments - organic	LM				no exposure		no exposure
Acrylic acid polymers	LM				no exposure		no exposure
Alcohols		13.4	clear	8.64	clear	3.1x10 ⁴	low or negligible
Water							
Resins	L				no exposure		no exposure
Ethylene glycol ethers		21.3	clear	2.1	clear	7688	low or negligible
Hydrocarbons - high molecular weight		526	possible	409	possible	2.3x10 ⁶	low or negligible
Amides or nitrogenous compounds		2.21	clear	37 (HQ)	clear	0.010 (HQ)	low or negligible
Alcohols		724	possible	0.68	clear	2463	low or negligible
WHITE							
Pigments - inorganic		3.33 (HQ)	possible		no exposure		no exposure
Acrylic acid polymers	LM				no exposure		no exposure
Water							
Resins	L				no exposure		no exposure
Alcohols		24.3	clear	3.03	clear	1.1x10 ⁴	low or negligible
Organic acids or salts	LM				no exposure		no exposure
Amides or nitrogenous compounds		1.54	clear	272 (HQ)	clear	0.075 (HQ)	low or negligible
Ethylene glycol ethers	LM				no exposure		no exposure
CYAN							
Pigments - organometallic		627	low or negligible		no exposure		no exposure
Acrylic acid polymers	LM				no exposure		no exposure
Water							
Ethylene glycol ethers		10.7	clear	1.78	clear	6520	low or negligible
Organic acids or salts	LM				no exposure		no exposure
Acrylic acid polymers	LM				no exposure		no exposure
Acrylic acid polymers	LM				no exposure		no exposure
Alcohols		37.3	clear	40.5	clear	1.5x10 ⁵	low or negligible
Ethylene glycol ethers		4426	low or negligible		no exposure		no exposure
Amides or nitrogenous compounds		4.41	clear	11 (HQ)	clear	0.003 (HQ)	low or negligible
MAGENTA							
Pigments - organic		41.7	clear		no exposure		no exposure
Acrylic acid polymers	LM				no exposure		no exposure

Formulation	SAT hazard level ^d	Occupational				General population	
		Dermal		Inhalation		Inhalation	
		Margin of Exposure ^{a,b}	Concern level ^c	Margin of Exposure ^{a,b}	Concern level	Margin of Exposure ^{a,b}	Concern level
Water							
Ethylene glycol ethers		10.6	clear	1.73	clear	6333	low or negligible
Acrylic acid polymers	LM				no exposure		no exposure
Acrylic acid polymers	LM				no exposure		no exposure
Organic acids or salts	LM				no exposure		no exposure
Amides or nitrogenous compounds		4.13	clear	12 (HQ)	clear	0.003 (HQ)	low or negligible
Water-based Ink #W2 – Site 1							
BLUE							
Water							
Pigments - organometallic		951	low or negligible		no exposure		no exposure
Resins		279	low or negligible		no exposure		no exposure
Resins	L				no exposure		no exposure
Acrylic acid polymers	LM				no exposure		no exposure
Pigments - organic	L				no exposure		no exposure
Pigments - organic	L				no exposure		no exposure
Ethylene glycol ethers	LM				no exposure		no exposure
Inorganics			low or negligible ^f		no exposure		no exposure
Ethylene glycol ethers	M				no exposure		no exposure
Amides or nitrogenous compounds		632	possible	5.6 (HQ)	possible	0.002 (HQ)	low or negligible
Hydrocarbons - high molecular weight		1.6 x10 ⁴	low or negligible	1.1 x10 ⁴	low or negligible	6.3x10 ⁷	low or negligible
Hydrocarbons - low molecular weight		0.27 (HQ)	low or negligible	0.3 (HQ)	low or negligible	7.0x10 ⁻⁵ (HQ)	low or negligible
Hydrocarbons - high molecular weight		1.1 x 10 ⁴	low or negligible	1.2 x10 ⁴	low or negligible	6.8x10 ⁷	low or negligible
Alcohols		0.13 (HQ)	low or negligible	0.55	clear	2020	low or negligible
Ethylene glycol ethers		131	possible	96.7	clear	5.4x10 ⁵	low or negligible
Alcohols		19.2	clear	11.6	clear	4.2x10 ⁴	low or negligible
GREEN							
Water							
Resins		157	low or negligible		no exposure		no exposure
Pigments - organic	LM				no exposure		no exposure
Acrylic acid polymers	LM				no exposure		no exposure
Resins	L				no exposure		no exposure
Ethylene glycol ethers	LM				no exposure		no exposure
Ethylene glycol ethers	M				no exposure		no exposure
Hydrocarbons - high molecular weight		8775	low or negligible	8821	low or negligible	4.9x10 ⁷	low or negligible

Formulation	SAT hazard level ^d	Occupational				General population	
		Dermal		Inhalation		Inhalation	
		Margin of Exposure ^{a,b}	Concern level ^c	Margin of Exposure ^{a,b}	Concern level	Margin of Exposure ^{a,b}	Concern level
Amides or nitrogenous compounds		247	possible	10 (HQ)	clear	0.003 (HQ)	low or negligible
Hydrocarbons - low molecular weight		0.47 (HQ)	low or negligible	0.3 (HQ)	low or negligible	9.1x10 ⁻⁵ (HQ)	low or negligible
WHITE							
Water							
Acrylic acid polymers	LM				no exposure		no exposure
Ethylene glycol ethers		8.29	clear	1.37	clear	7599	low or negligible
Amides or nitrogenous compounds		51	clear	308 (HQ)	clear	0.084 (HQ)	low or negligible
Alcohols		2.01 (HQ)	possible	0.008	clear	29	possible
Hydrocarbons - high molecular weight		6983	low or negligible	1152	low or negligible	6.3x10 ⁶	low or negligible
Pigments - inorganic		2.93 (HQ)	possible		no exposure		no exposure
Alcohols		383	possible	52.4	clear	1.9x10 ⁵	low or negligible
CYAN							
Water							
Pigments - organometallic		387	low or negligible		no exposure		no exposure
Resins	L				no exposure		no exposure
Ethylene glycol ethers	LM				no exposure		no exposure
Alcohols		1.58 (HQ)	possible	0.21	clear	781	low or negligible
Ethylene glycol ethers		11	clear	37.3	clear	2.1x10 ⁵	low or negligible
Amides or nitrogenous compounds		115	possible	6.4 (HQ)	possible	0.002 (HQ)	low or negligible
MAGENTA							
Water							
Resins		140	low or negligible		no exposure		no exposure
Acrylic acid polymers	LM				no exposure		no exposure
Ethylene glycol ethers	LM				no exposure		no exposure
Ethylene glycol ethers	M				no exposure		no exposure
Hydrocarbons - high molecular weight		7795	low or negligible	2.8 x10 ⁴	low or negligible	1.6x10 ⁸	low or negligible
Amides or nitrogenous compounds		86.8	clear	8.2 (HQ)	possible	0.002 (HQ)	low or negligible
Hydrocarbons - low molecular weight		0.54 (HQ)	low or negligible	0.1 (HQ)	low or negligible	2.8x10 ⁻⁵ (HQ)	low or negligible
Pigments - organic	L				no exposure		no exposure
Alcohols		1.64 (HQ)	possible	0.21	clear	775	low or negligible
Ethylene glycol ethers		10	clear	37	clear	2.1x10 ⁵	low or negligible
Water-based Ink #W3 – Site 2							
BLUE							
Water							

Formulation	SAT hazard level ^d	Occupational				General population	
		Dermal		Inhalation		Inhalation	
		Margin of Exposure ^{a,b}	Concern level ^c	Margin of Exposure ^{a,b}	Concern level	Margin of Exposure ^{a,b}	Concern level
Acrylic acid polymers	LM				no exposure		no exposure
Pigments - organic	L				no exposure		no exposure
Acrylic acid polymers	LM				no exposure		no exposure
Amides or nitrogenous compounds		2.01	clear	70 (HQ)	clear	0.019 (HQ)	low or negligible
Ethylene glycol ethers	LM				no exposure		no exposure
Siloxanes		725	possible		no exposure		no exposure
Olefin polymers	LM				no exposure		no exposure
Organic acids or salts	LM				no exposure		no exposure
Alcohols		69.1	clear	25.6	clear	9.3x10 ⁴	low or negligible
Amides or nitrogenous compounds		1111	low or negligible	5.2 (HQ)	possible	0.001 (HQ)	low or negligible
Alcohols		1.4 x 10 ⁴	low or negligible	7.76	clear	2.8x10 ⁴	low or negligible
Polyfunctional aziridine					no exposure		no exposure
Other components							
GREEN							
Water							
Acrylic acid polymers	LM				no exposure		no exposure
Pigments - organometallic		646	possible		no exposure		no exposure
Acrylic acid polymers	LM				no exposure		no exposure
Amides or nitrogenous compounds		1.49	clear	93 (HQ)	clear	0.026 (HQ)	low or negligible
Pigments - organic	L				no exposure		no exposure
Alcohols		279	possible	0.15	clear	574	low or negligible
Olefin polymers	LM				no exposure		no exposure
Ethylene glycol ethers		18.5	clear	8.41	clear	4.7x10 ⁴	low or negligible
Siloxanes		862	possible		no exposure		no exposure
Organic acids or salts	LM				no exposure		no exposure
Alcohols		129	clear	48.5	clear	1.8x10 ⁵	low or negligible
Amides or nitrogenous compounds		2039	low or negligible	2.8 (HQ)	possible	7.6x10 ⁻⁴ (HQ)	low or negligible
Alcohols						1.6x10 ⁴	low or negligible
WHITE							
Pigments - inorganic		2.55 (HQ)	possible		no exposure		no exposure
Water							
Acrylic acid polymers	LM				no exposure		no exposure
Acrylic acid polymers	LM				no exposure		no exposure
Amides or nitrogenous compounds		2.27	clear	154 (HQ)	clear	0.042 (HQ)	low or negligible
Ethylene glycol ethers	LM				no exposure		no exposure
Olefin polymers	LM				no exposure		no exposure
Siloxanes		571	possible		no exposure		no exposure

Formulation	SAT hazard level ^d	Occupational				General population	
		Dermal		Inhalation		Inhalation	
		Margin of Exposure ^{a,b}	Concern level ^c	Margin of Exposure ^{a,b}	Concern level	Margin of Exposure ^{a,b}	Concern level
Alcohols		0.73 (HQ)	low or negligible	0.024	clear	86	possible
Organic acids or salts	LM				no exposure		no exposure
Alcohols		85.7	clear	12.8	clear	4.6 x10 ⁴	low or negligible
Amides or nitrogenous compounds		2526	low or negligible	5.7 (HQ)	possible	0.002 (HQ)	low or negligible
Alcohols		1.7 x10 ⁴	low or negligible	3.77	clear	1.4x10 ⁴	low or negligible
CYAN							
Water							
Acrylic acid polymers	LM				no exposure		no exposure
Pigments - organometallic		1554	low or negligible		no exposure		no exposure
Acrylic acid polymers	LM				no exposure		no exposure
Amides or nitrogenous compounds		1.12	clear	54 (HQ)	clear	0.015 (HQ)	low or negligible
Olefin polymers	LM				no exposure		no exposure
Ethylene glycol ethers	LM				no exposure		no exposure
Siloxanes		409	possible		no exposure		no exposure
Propylene glycol ethers		1.9 x10 ⁴	low or negligible	1483	low or negligible	5.4x10 ⁶	low or negligible
Alcohols	LM				no exposure		no exposure
Organic acids or salts	LM				no exposure		no exposure
Amides or nitrogenous compounds		374	possible	6.6 (HQ)	possible	0.002 (HQ)	low or negligible
MAGENTA							
Water							
Acrylic acid polymers	LM				no exposure		no exposure
Acrylic acid polymers	LM				no exposure		no exposure
Pigments - organometallic		32.7	clear		no exposure		no exposure
Amides or nitrogenous compounds		1.62	clear	58 (HQ)	clear	0.016 (HQ)	low or negligible
Ethylene glycol ethers	LM				no exposure		no exposure
Olefin polymers	LM				no exposure		no exposure
Siloxanes		510	possible		no exposure		no exposure
Propylene glycol ethers		2.7 x10 ⁴	low or negligible	1317	low or negligible	4.8x10 ⁶	low or negligible
Organic acids or salts	LM				no exposure		no exposure
Alcohols	LM				no exposure		no exposure
Amides or nitrogenous compounds		578	possible	6.6 (HQ)	possible	0.002 (HQ)	low or negligible
Alcohols		2340	low or negligible	1310	low or negligible	4.9x10 ⁶	low or negligible
Alcohols		1.1 x10 ⁴	low or negligible	8.73	clear	3.2x10 ⁴	low or negligible
Water-based Ink #W3 – Site 3							
BLUE							
Water							

Formulation	SAT hazard level ^d	Occupational				General population	
		Dermal		Inhalation		Inhalation	
		Margin of Exposure ^{a,b}	Concern level ^c	Margin of Exposure ^{a,b}	Concern level	Margin of Exposure ^{a,b}	Concern level
Acrylic acid polymers	LM				no exposure		no exposure
Pigments - organic	L				no exposure		no exposure
Acrylic acid polymers	LM				no exposure		no exposure
Amides or nitrogenous compounds		1.49	clear	49 (HQ)	clear	0.014 (HQ)	low or negligible
Ethylene glycol ethers	LM				no exposure		no exposure
Siloxanes		532	possible		no exposure		no exposure
Olefin polymers	LM				no exposure		no exposure
Organic acids or salts	LM				no exposure		no exposure
Alcohols		21.1	clear	15	clear	5.4x10 ⁴	low or negligible
Amides or nitrogenous compounds		72.5	clear	42 (HQ)	clear	0.011 (HQ)	low or negligible
GREEN							
Water							
Acrylic acid polymers	LM				no exposure		no exposure
Pigments - organometallic		450	possible		no exposure		no exposure
Acrylic acid polymers	LM				no exposure		no exposure
Amides or nitrogenous compounds		1.05	clear	92 (HQ)	clear	0.025 (HQ)	low or negligible
Pigments - organic	LM				no exposure		no exposure
Alcohols		202	possible	0.16	clear	574	low or negligible
Olefin polymers	LM				no exposure		no exposure
Ethylene glycol ethers		12.9	clear	8.41	clear	4.7x10 ⁴	low or negligible
Siloxanes		601	possible		no exposure		no exposure
Organic acids or salts	LM				no exposure		no exposure
Amides or nitrogenous compounds		4684	low or negligible	0.8 (HQ)	low or negligible	2.3x10 ⁻⁴ (HQ)	low or negligible
WHITE							
Pigments - inorganic		2.70 (HQ)	possible		no exposure		no exposure
Water							
Acrylic acid polymers	LM				no exposure		no exposure
Acrylic acid polymers	LM				no exposure		no exposure
Amides or nitrogenous compounds		2.16	clear	217 (HQ)	clear	0.060 (HQ)	low or negligible
Ethylene glycol ethers	LM				no exposure		no exposure
Olefin polymers	LM				no exposure		no exposure
Siloxanes		541	possible		no exposure		no exposure
Alcohols		0.77 (HQ)	low or negligible	0.017	clear	61	possible
Organic acids or salts	LM				no exposure		no exposure
Extender							no exposure
Alcohols		30.5	clear	3.38	clear	1.2x10 ⁴	low or negligible
Amides or nitrogenous compounds		288	possible	67 (HQ)	clear	0.018 (HQ)	low or negligible

Formulation	SAT hazard level ^d	Occupational				General population	
		Dermal		Inhalation		Inhalation	
		Margin of Exposure ^{a,b}	Concern level ^c	Margin of Exposure ^{a,b}	Concern level	Margin of Exposure ^{a,b}	Concern level
CYAN							
Water							
Acrylic acid polymers	LM				no exposure		no exposure
Pigments - organometallic		1474	low or negligible		no exposure		no exposure
Acrylic acid polymers	LM				no exposure		no exposure
Amides or nitrogenous compounds		1.06	clear	26 (HQ)	clear	0.007 (HQ)	low or negligible
Olefin polymers	LM				no exposure		no exposure
Ethylene glycol ethers	LM				no exposure		no exposure
Siloxanes		388	possible		no exposure		no exposure
Propylene glycol ethers		1.8 x10 ⁴	low or negligible	3087	low or negligible	1.1x10 ⁷	low or negligible
Alcohols	LM				no exposure		no exposure
Organic acids or salts	LM				no exposure		no exposure
Amides or nitrogenous compounds		158	possible	7.2 (HQ)	possible	0.002 (HQ)	low or negligible
MAGENTA							
Water							
Acrylic acid polymers	LM				no exposure		no exposure
Acrylic acid polymers	LM				no exposure		no exposure
Pigments - organometallic		24	clear		no exposure		no exposure
Amides or nitrogenous compounds		1.2	clear	17 (HQ)	clear	0.005 (HQ)	low or negligible
Ethylene glycol ethers	LM				no exposure		no exposure
Olefin polymers	LM				no exposure		no exposure
Siloxanes		376	possible		no exposure		no exposure
Propylene glycol ethers		2.0 x10 ⁴	low or negligible	4526	low or negligible	1.7x10 ⁷	low or negligible
Organic acids or salts	LM				no exposure		no exposure
Alcohols	LM				no exposure		no exposure
Ethylene glycol ethers		556	low or negligible	405	low or negligible	1.4x10 ⁶	low or negligible
Amides or nitrogenous compounds		115	possible	7.2 (HQ)	possible	0.002 (HQ)	low or negligible
Water-based Ink #W4 – Site 9A							
BLUE							
Water							
Pigments - organometallic		770	low or negligible		no exposure		no exposure
Acrylic acid polymers	LM				no exposure		no exposure
Resins	L				no exposure		no exposure
Pigments - organometallic	LM				no exposure		no exposure
Alcohols		88.2	clear	0.18	clear	662	low or negligible
Propylene glycol ethers		2.54 (HQ)	possible	1.8 (HQ)	possible	5.0x10 ⁻⁵ (HQ)	low or negligible

Formulation	SAT hazard level ^d	Occupational				General population	
		Dermal		Inhalation		Inhalation	
		Margin of Exposure ^{a,b}	Concern level ^c	Margin of Exposure ^{a,b}	Concern level	Margin of Exposure ^{a,b}	Concern level
Propylene glycol ethers		23	possible	39.9	possible	1.5x10 ⁵	low or negligible
Hydrocarbons - high molecular weight	LM						
Amides or nitrogenous compounds		2242	low or negligible	27.6	clear	1.0x10 ⁵	low or negligible
Siloxanes	LM				no exposure		no exposure
Alcohols	LM				no exposure		no exposure
Amides or nitrogenous compounds		3.0 x10 ⁴	low or negligible	5.2 x10 ⁴	low or negligible	2.9x10 ⁸	low or negligible
Alcohols		39.4	clear	55.9	clear	2.0x10 ⁵	low or negligible
Amides or nitrogenous compounds		290	possible	5.2 (HQ)	possible	0.001 (HQ)	low or negligible
GREEN							
Water							
Pigments - inorganic		2.55 (HQ)	possible	0 (HQ)	no exposure	0.0 (HQ)	no exposure
Acrylic acid polymers	LM				no exposure		no exposure
Alcohols		20.1	clear	29.8	clear	1.1x10 ⁵	low or negligible
Pigments - organic	LM				no exposure		no exposure
Resins	L				no exposure		no exposure
Pigments - organometallic		6881	low or negligible		no exposure		no exposure
Pigments - organometallic		3154	low or negligible		no exposure		no exposure
Alcohols		180	possible	0.39	clear	1410	low or negligible
Amides or nitrogenous compounds		7741	low or negligible	1.4 x10 ⁴	low or negligible	7.7x10 ⁷	low or negligible
Amides or nitrogenous compounds		8.26	clear	4.3 (HQ)	possible	0.001 (HQ)	low or negligible
Hydrocarbons - high molecular weight	LM						
Amides or nitrogenous compounds		2294	low or negligible	29.4	clear	1.1x10 ⁵	low or negligible
Siloxanes	LM				no exposure		no exposure
Alcohols	LM				no exposure		no exposure
Amides or nitrogenous compounds		381	possible	3.8 (HQ)	possible	0.001 (HQ)	low or negligible
WHITE							
Pigments - inorganic		4.52 (HQ)	possible		no exposure		no exposure
Water							
Acrylic acid polymers	LM				no exposure		no exposure
Inorganics			low or negligible ^f		no exposure		no exposure
Alcohols		151	possible	0.040	clear	143	low or negligible
Alcohols		54.9	clear	9.88	clear	3.6x10 ⁴	low or negligible

Formulation	SAT hazard level ^d	Occupational				General population	
		Dermal		Inhalation		Inhalation	
		Margin of Exposure ^{a,b}	Concern level ^c	Margin of Exposure ^{a,b}	Concern level	Margin of Exposure ^{a,b}	Concern level
Amides or nitrogenous compounds		6.92	clear	42 (HQ)	clear	0.012 (HQ)	low or negligible
Hydrocarbons - high molecular weight	LM						
Amides or nitrogenous compounds		1923	low or negligible	2.99	clear	1.1x10 ⁴	low or negligible
Siloxanes	LM				no exposure		no exposure
Alcohols	LM				no exposure		no exposure
CYAN							
Water							
Pigments - organometallic		954	low or negligible		no exposure		no exposure
Acrylic acid polymers	LM				no exposure		no exposure
Resins	L				no exposure		no exposure
Alcohols		63.1	clear	0.11	clear	413	low or negligible
Propylene glycol ethers		3.36 (HQ)	possible	2.8 (HQ)	possible	7.6x10 ⁻⁵ (HQ)	low or negligible
Propylene glycol ethers		15.9	possible		no exposure		no exposure
Alcohols		1.1 x10 ⁴	low or negligible	3345	low or negligible	1.2X10 ⁷	low or negligible
Hydrocarbons - high molecular weight	LM						
Amides or nitrogenous compounds		1639	low or negligible	17.5	clear	6.4x10 ⁴	low or negligible
Siloxanes	LM				no exposure		no exposure
Alcohols	LM				no exposure		no exposure
Amides or nitrogenous compounds		3.8 x10 ⁴	low or negligible	5.6 x10 ⁴	low or negligible	3.1x10 ⁸	low or negligible
Solids					no exposure		no exposure
Ethylene glycol ethers							
Petroleum distillate	LM				no exposure		no exposure
Alcohols		38.6	clear	47.4	clear	1.7x10 ⁵	low or negligible
Amides or nitrogenous compounds		282	possible	6.1 (HQ)	possible	0.0 (HQ)	low or negligible
MAGENTA							
Water							
Pigments - organometallic		11.2	clear		no exposure		no exposure
Acrylic acid polymers	LM				no exposure		no exposure
Alcohols		103	possible	0.27	clear	991	low or negligible
Alcohols		25.8	clear	47.3	clear	1.7x10 ⁵	low or negligible
Amides or nitrogenous compounds		4412	low or negligible	9762	low or negligible	5.4x10 ⁷	low or negligible
Amides or nitrogenous compounds		980	low or negligible	15.5	clear	5.7x10 ⁴	low or negligible
Hydrocarbons - high molecular weight	LM						

Formulation	SAT hazard level ^d	Occupational				General population	
		Dermal		Inhalation		Inhalation	
		Margin of Exposure ^{a,b}	Concern level ^c	Margin of Exposure ^{a,b}	Concern level	Margin of Exposure ^{a,b}	Concern level
Siloxanes	LM				no exposure		no exposure
Alcohols	LM				no exposure		no exposure
Amides or nitrogenous compounds		622	possible	1.9 (HQ)	possible	5.2x10 ⁻⁴ (HQ)	low or negligible
UV-cured Ink #U1 – Site 11							
BLUE							
Acrylated polymers	LM				no exposure		no exposure
Pigments - organic	L				no exposure		no exposure
Acrylated polymers					no exposure		no exposure
Aromatic esters	LM						
Aromatic ketones		2521	low or negligible		no exposure		no exposure
Aromatic ketones	LM				no exposure		no exposure
Amides or nitrogenous compounds	M						
Siloxanes	LM				no exposure		no exposure
Olefin polymers	LM				no exposure		no exposure
GREEN							
Acrylated polymers	LM				no exposure		no exposure
Pigments - organometallic		314	possible		no exposure		no exposure
Acrylated polymers					no exposure		no exposure
Aromatic esters	LM						
Aromatic ketones		2564	low or negligible		no exposure		no exposure
Aromatic ketones	LM				no exposure		no exposure
Amides or nitrogenous compounds	M						
Siloxanes	LM				no exposure		no exposure
Olefin polymers	LM				no exposure		no exposure
Acrylated polyols	M						
WHITE							
Acrylated polymers	LM				no exposure		no exposure
Acrylated polymers	LM				no exposure		no exposure
Acrylated polymers					no exposure		no exposure
Aromatic ketones	LM				no exposure		no exposure
Aromatic esters	LM						
Organophosphorus compounds		103	low or negligible		no exposure		no exposure
Amides or nitrogenous compounds	M						
Siloxanes	LM				no exposure		no exposure
Olefin polymers	LM				no exposure		no exposure
Pigments - inorganic		3.25 (HQ)	possible		no exposure		no exposure
Pigments - inorganic	LM				no exposure		no exposure
CYAN							
Acrylated polymers	LM				no exposure		no exposure
Pigments - organometallic		671	low or		no exposure		no exposure

Formulation	SAT hazard level ^d	Occupational				General population	
		Dermal		Inhalation		Inhalation	
		Margin of Exposure ^{a,b}	Concern level ^c	Margin of Exposure ^{a,b}	Concern level	Margin of Exposure ^{a,b}	Concern level
Acrylated polymers					no exposure		no exposure
Aromatic esters	LM						
Aromatic ketones		2521	low or negligible		no exposure		no exposure
Aromatic ketones	LM				no exposure		no exposure
Amides or nitrogenous compounds	M						
Siloxanes	LM				no exposure		no exposure
Olefin polymers	LM				no exposure		no exposure
MAGENTA							
Acrylated polymers	LM				no exposure		no exposure
Pigments - organometallic		11.2	clear		no exposure		no exposure
Acrylated polymers					no exposure		no exposure
Aromatic esters	LM						
Aromatic ketones		2521	low or negligible		no exposure		no exposure
Aromatic ketones	LM				no exposure		no exposure
Amides or nitrogenous compounds	M						
Siloxanes	LM				no exposure		no exposure
Olefin polymers	LM				no exposure		no exposure
UV-cured Ink #U2 – Site 6							
BLUE							
Acrylated polymers	LM				no exposure		no exposure
Acrylated polymers		67.5	clear		no exposure		no exposure
Pigments - organometallic		1029	low or negligible		no exposure		no exposure
Acrylated polyols		1.1	clear	1.38	clear	4299	low or negligible
Acrylated polyols	M						
Polyol derivatives	L				no exposure		no exposure
Acrylated polymers	LM				no exposure		no exposure
Pigments - organic	L				no exposure		no exposure
Acrylated polyols		0.94	clear		no exposure		no exposure
Aromatic ketones	L				no exposure		no exposure
Aromatic ketones		59.9	possible	74.8	possible	3.5x10 ⁵	low or negligible
Aromatic ketones		44.9	possible		no exposure		no exposure
Olefin polymers		1.1 x 10 ⁴	low or negligible		no exposure		no exposure
Alcohols	LM				no exposure		no exposure
Aromatic ketones	L				no exposure		no exposure
GREEN							
Acrylated polymers	LM				no exposure		no exposure
Acrylated polyols		0.35	clear		no exposure		no exposure
Acrylated polyols		0.69	clear	1.66	clear	5153	low or negligible
Acrylated polymers		62.3	clear		no exposure		no exposure

Formulation	SAT hazard level ^d	Occupational				General population	
		Dermal		Inhalation		Inhalation	
		Margin of Exposure ^{a,b}	Concern level ^c	Margin of Exposure ^{a,b}	Concern level	Margin of Exposure ^{a,b}	Concern level
Pigments - organometallic		473	possible		no exposure		no exposure
Polyol derivatives	L				no exposure		no exposure
Acrylated polyols	M						
Acrylated polymers	LM				no exposure		no exposure
Pigments - organic	LM				no exposure		no exposure
Aromatic ketones	L				no exposure		no exposure
Aromatic ketones		59.9	possible	142	low or negligible	6.7x10 ⁵	low or negligible
Aromatic ketones		44.9	possible		no exposure		no exposure
Olefin polymers		1.1 x10 ⁴	low or negligible		no exposure		no exposure
Alcohols	LM				no exposure		no exposure
Aromatic ketones	L				no exposure		no exposure
WHITE							
Pigments - inorganic		3.72 (HQ)	possible		no exposure		no exposure
Acrylated polyols		0.22	clear		no exposure		no exposure
Acrylated polyols		0.56	clear	0.18	clear	578	possible
Acrylated polyols	M						
Acrylated polymers	LM				no exposure		no exposure
Organophosphorus compounds		7.14	clear		no exposure		no exposure
Aromatic ketones	L				no exposure		no exposure
Aromatic ketones		89.5	possible		no exposure		no exposure
Alcohols	LM				no exposure		no exposure
Olefin polymers		1.1 x10 ⁴	low or negligible		no exposure		no exposure
Aromatic ketones		64.9	possible	21.6	possible	1.0x10 ⁵	low or negligible
Aromatic ketones	L				no exposure		no exposure
CYAN							
Acrylated polymers	LM				no exposure		no exposure
Pigments - organometallic		701	low or negligible		no exposure		no exposure
Acrylated polyols	M						
Acrylated polymers		70.4	clear		no exposure		no exposure
Acrylated polyols		1.44	clear	4.35	clear	1.4x10 ⁴	low or negligible
Polyol derivatives	L				no exposure		no exposure
Acrylated polymers	LM				no exposure		no exposure
Aromatic ketones	L				no exposure		no exposure
Aromatic ketones		60.6	possible	182	low or negligible	8.6x10 ⁵	low or negligible
Aromatic ketones		45.5	possible		no exposure		no exposure
Olefin polymers		1.1 x10 ⁴	low or negligible		no exposure		no exposure
Alcohols	LM				no exposure		no exposure
Aromatic ketones	L				no exposure		no exposure
Acrylated polyols		6.82	clear		no exposure		no exposure

Formulation	SAT hazard level ^d	Occupational				General population	
		Dermal		Inhalation		Inhalation	
		Margin of Exposure ^{a,b}	Concern level ^c	Margin of Exposure ^{a,b}	Concern level	Margin of Exposure ^{a,b}	Concern level
MAGENTA							
Acrylated polymers	LM				no exposure		no exposure
Pigments - organometallic		11.1	clear		no exposure		no exposure
Acrylated polymers		52	clear		no exposure		no exposure
Acrylated polyols		1.36	clear	2.65	clear	8232	low or negligible
Acrylated polyols		0.49	clear		no exposure		no exposure
Polyol derivatives	L				no exposure		no exposure
Acrylated polymers	LM				no exposure		no exposure
Acrylated polyols	M						
Aromatic ketones	L				no exposure		no exposure
Aromatic ketones		59.9	possible	116	low or negligible	5.5x10 ⁵	low or negligible
Aromatic ketones		44.9	possible		no exposure		no exposure
Olefin polymers		1.1 x10 ⁴	low or negligible		no exposure		no exposure
Alcohols	LM				no exposure		no exposure
Aromatic ketones	L				no exposure		no exposure
UV-cured Ink #U3 – Site 8							
BLUE							
Acrylated polymers	LM				no exposure		no exposure
Pigments - organic	L				no exposure		no exposure
Acrylated polyols	M						
Aromatic esters	LM						
Aromatic ketones		2521	low or negligible		no exposure		no exposure
Aromatic ketones	LM				no exposure		no exposure
Amides or nitrogenous compounds	M						
Siloxanes	LM				no exposure		no exposure
Olefin polymers	LM				no exposure		no exposure
GREEN							
Acrylated polymers	LM				no exposure		no exposure
Pigments - organometallic		308	possible		no exposure		no exposure
Acrylated polyols	M						
Aromatic esters	LM						
Aromatic ketones		2521	low or negligible		no exposure		no exposure
Aromatic ketones	LM				no exposure		no exposure
Amides or nitrogenous compounds	M						
Siloxanes	LM				no exposure		no exposure
Olefin polymers	LM				no exposure		no exposure
WHITE							
Pigments - inorganic		3.63 (HQ)	possible		no exposure		no exposure
Acrylated polymers	LM				no exposure		no exposure
Acrylated polymers	LM				no exposure		no exposure

Formulation	SAT hazard level ^d	Occupational				General population	
		Dermal		Inhalation		Inhalation	
		Margin of Exposure ^{a,b}	Concern level ^c	Margin of Exposure ^{a,b}	Concern level	Margin of Exposure ^{a,b}	Concern level
Acrylated polymers	LM				no exposure		no exposure
Aromatic esters	LM						
Organophosphorus compounds		97.1	possible		no exposure		no exposure
Amides or nitrogenous compounds	M						
Siloxanes	LM				no exposure		no exposure
Olefin polymers	LM				no exposure		no exposure
Aromatic ketones	LM				no exposure		no exposure
CYAN							
Acrylated polymers	LM				no exposure		no exposure
Pigments - organometallic		671	low or negligible		no exposure		no exposure
Acrylated polyols	M						
Aromatic esters	LM						
Aromatic ketones		2521	low or negligible		no exposure		no exposure
Aromatic ketones	LM				no exposure		no exposure
Amides or nitrogenous compounds	M						
Siloxanes	LM				no exposure		no exposure
Olefin polymers	LM				no exposure		no exposure
MAGENTA							
Acrylated polymers	LM				no exposure		no exposure
Pigments - organic	L				no exposure		no exposure
Acrylated polyols	M						
Aromatic esters	LM						
Aromatic ketones		2521	low or negligible		no exposure		no exposure
Aromatic ketones	LM				no exposure		no exposure
Amides or nitrogenous compounds	M						
Siloxanes	LM				no exposure		no exposure
Olefin polymers	LM				no exposure		no exposure

^a A Margin-of-Exposure (MOE) or a Hazard Quotient (HQ) gives an estimate of the "margin of safety" between an estimated exposure level and the level at which adverse effects may occur. Hazard Quotient values below unity imply that adverse effects are very unlikely to occur. The more the Hazard Quotient exceeds unity, the greater the level of concern. High MOE values, such as values greater than 100 for a NOAEL-based MOE or 1000 for a LOAEL-based MOE, imply a low level of concern. As the MOE decreases, the level of concern increases.

^b The absence of HQ or MOE values in this table indicates that insufficient hazard data were available to calculate a HQ or MOE for that chemical.

^c The Concern Level is derived from a MOE or an HQ. The criteria in Table 3.15 on page 3-48 were used.

^d SAT Levels of Concern are generated by the OPPT Structure Activity Team to predict toxicity based on analog data and/or structure-activity considerations. L = low, LM = low to moderate, and M = moderate.

^e No level of concern could be assigned to this chemical due to no exposure.

^f A chronic/subchronic MOE was not available for this chemical due to a lack of hazard data for this route of exposure; however, the risk associated with dermal exposure to this chemical is expected to be very low.

Appendix 3-J (Risk Chapter)

Developmental Toxicity

Risk Results

Formulation	Occupational				General Population	
	Dermal		Inhalation		Inhalation	
	MOE ^{a,b}	Concern Level ^c	MOE	Concern Level	MOE	Concern Level
Solvent-based Ink #S1 – Site 9B						
BLUE						
Alcohols	10.2	possible	467	low or negligible	2.3x10 ⁶	low or negligible
Alkyl acetates						
Pigments - organometallic				no exposure		no exposure
Polyol derivatives				no exposure		no exposure
Resins				no exposure		no exposure
Resins				no exposure		no exposure
Alcohols	0.0057	clear	843	possible	4.1x10 ⁶	low or negligible
Pigments - organometallic		SAT		no exposure		no exposure
Aromatic esters	218	low or negligible		no exposure		no exposure
Organotitanium compounds		SAT		no exposure		no exposure
Alkyl acetates						
Resins				no exposure		no exposure
Water						
Organic acids or salts		SAT		no exposure		no exposure
Organic acids or salts	1.4x10 ⁵	low or negligible		no exposure		no exposure
Alcohols	268	low or negligible	244	low or negligible	1.2x10 ⁶	low or negligible
GREEN						
Alcohols	15.1	possible	550	low or negligible	2.7x10 ⁶	low or negligible
Alcohols	108	low or negligible	78.2	possible	3.8x10 ⁵	low or negligible
Alkyl acetates						
Polyol derivatives				no exposure		no exposure
Pigments - organic				no exposure		no exposure
Pigments - organometallic				no exposure		no exposure
Alkyl acetates	1345.033	low or negligible	973	possible	4.7x10 ⁶	low or negligible
Alcohols	0.0099	clear	1177	low or negligible	5.7x10 ⁶	low or negligible
Propylene glycol ethers	1046	low or negligible	756	low or negligible	3.7x10 ⁶	low or negligible
Resins				no exposure		no exposure
Resins				no exposure		no exposure
Inorganics	5.3x10 ⁴	low or negligible		no exposure		no exposure
Water						
WHITE						
Pigments - inorganic				no exposure ^d		no exposure
Alcohols	14.6	possible	84.7	possible	4.1x10 ⁶	low or negligible
Hydrocarbons - low molecular weight						
Resins				no exposure		no exposure
Resins				no exposure		no exposure
Alkyl acetates						
Alkyl acetates						

Formulation	Occupational				General Population	
	Dermal		Inhalation		Inhalation	
	MOE ^{a,b}	Concern Level ^c	MOE	Concern Level	MOE	Concern Level
Alcohols	0.01665	clear	314	possible	1.5x10 ⁶	low or negligible
Hydrocarbons - high molecular weight				no exposure		no exposure
Polyol derivatives				no exposure		no exposure
Organotitanium compounds		SAT ^e		no exposure		no exposure
Organic acids or salts	6.7x10 ⁴	low or negligible		no exposure		no exposure
Water						
Alcohols	4231	low or negligible	489	low or negligible	2.4x10 ⁶	low or negligible
CYAN						
Alcohols	74.9	possible	67.2	possible	3.2x10 ⁵	low or negligible
Pigments - organometallic				no exposure		no exposure
Resins				no exposure		no exposure
Alkyl acetates	561	possible	504	possible	2.5x10 ⁶	low or negligible
Propylene glycol ethers	699	low or negligible	627	low or negligible	3.1x10 ⁶	low or negligible
Polyol derivatives				no exposure		no exposure
Alcohols	0.01659	clear	2437	low or negligible	1.2x10 ⁷	low or negligible
Resins				no exposure		no exposure
Water						
Alkyl acetates						
MAGENTA						
Alcohols	84.8	possible	73.5	possible	3.5x10 ⁵	low or negligible
Alcohols	28.3	possible	1231	low or negligible	3.0x10 ⁶	low or negligible
Pigments - organometallic		SAT		no exposure		no exposure
Resins				no exposure		no exposure
Alkyl acetates						
Propylene glycol ethers	913	low or negligible	791	low or negligible	3.9x10 ⁶	low or negligible
Polyol derivatives				no exposure		no exposure
Alkyl acetates	2347.977	low or negligible	2031	low or negligible	9.9x10 ⁶	low or negligible
Alcohols	0.01327	clear	1878	low or negligible	9.1x10 ⁶	low or negligible
Inorganics	20.8	clear		no exposure		no exposure
Pigments - organometallic				no exposure		no exposure
Resins				no exposure		no exposure
Water						
Trade secret						
Propylene glycol ethers	703	low or negligible	607	low or negligible	3.0x10 ⁶	low or negligible
Solvent-based Ink #S2 – Site 5						
BLUE						
Alcohols	8.22	clear	158	low or negligible	7.7x10 ⁵	low or negligible
Resins				no exposure		no exposure
Hydrocarbons - low molecular weight						
Alkyl acetates						
Alcohols	935	low or negligible	355	low or negligible	1.7x10 ⁶	low or negligible
Alcohols	0.0058	clear	361	possible	1.7x10 ⁶	low or negligible
Pigments - organometallic				no exposure		no exposure
Pigments - organometallic		SAT		no exposure		no exposure

Formulation	Occupational				General Population	
	Dermal		Inhalation		Inhalation	
	MOE ^{a,b}	Concern Level ^c	MOE	Concern Level	MOE	Concern Level
Polyol derivatives				no exposure		no exposure
Amides or nitrogenous compounds				no exposure		no exposure
Organic acids or salts	1.4x10 ⁴	low or negligible		no exposure		no exposure
Siloxanes	456	possible		no exposure		no exposure
Amides or nitrogenous compounds				no exposure		no exposure
Organophosphorus compounds	328	possible		no exposure		no exposure
Hydrocarbons - low molecular weight						
GREEN						
Alcohols	9.66	clear	165	low or negligible	8.0x10 ⁵	low or negligible
Resins				no exposure		no exposure
Hydrocarbons - low molecular weight						
Alkyl acetates						
Pigments - inorganic				no exposure		no exposure
Alcohols	907	low or negligible	307	low or negligible	1.5x10 ⁶	low or negligible
Alcohols	0.0057	clear	319	possible	1.5x10 ⁶	low or negligible
Pigments - organic				no exposure		no exposure
Polyol derivatives				no exposure		no exposure
Pigments - organometallic				no exposure		no exposure
Pigments - inorganic				no exposure		no exposure
Amides or nitrogenous compounds				no exposure		no exposure
Organic acids or salts	1.2x10 ⁴	low or negligible		no exposure		no exposure
Siloxanes	406	possible		no exposure		no exposure
Amides or nitrogenous compounds				no exposure		no exposure
Organophosphorus compounds	292	possible		no exposure		no exposure
Hydrocarbons - low molecular weight						
WHITE						
Pigments - inorganic				no exposure		no exposure
Resins				no exposure		no exposure
Alcohols	12.9	possible	81.4	Possible	4.0x10 ⁵	low or negligible
Hydrocarbons - low molecular weight						
Alcohols	0.01049	clear	215	possible	1.0x10 ⁶	low or negligible
Amides or nitrogenous compounds				no exposure		no exposure
Organic acids or salts	1.2x10 ⁴	low or negligible		no exposure		no exposure
Siloxanes	405	possible		no exposure		no exposure
Hydrocarbons - low molecular weight						
Alkyl acetates						
CYAN						
Alcohols	9.0	clear	118	low or negligible	5.8x10 ⁵	low or negligible

Formulation	Occupational				General Population	
	Dermal		Inhalation		Inhalation	
	MOE ^{a,b}	Concern Level ^c	MOE	Concern Level	MOE	Concern Level
Hydrocarbons - low molecular weight						
Resins				no exposure		no exposure
Pigments - organometallic				no exposure		no exposure
Alcohols	0.0057	clear	243	possible	1.2x10 ⁶	low or negligible
Alkyl acetates						
Alcohols	1028	low or negligible	268	low or negligible	1.3x10 ⁶	low or negligible
Amides or nitrogenous compounds				no exposure		no exposure
Organic acids or salts	1.3x10 ⁴	low or negligible		no exposure		no exposure
Siloxanes	418	possible		no exposure		no exposure
Amides or nitrogenous compounds				no exposure		no exposure
Polyol derivatives				no exposure		no exposure
Hydrocarbons - low molecular weight						
Organophosphorus compounds	301	possible		no exposure		no exposure
MAGENTA						
Alcohols	10.3	possible	174	low or negligible	8.5x10 ⁵	low or negligible
Hydrocarbons - low molecular weight						
Resins				no exposure		no exposure
Pigments - organometallic		SAT		no exposure		no exposure
Alcohols	0.003	clear	177	possible	8.5x10 ⁵	low or negligible
Alkyl acetates						
Alcohols	891	low or negligible	299	low or negligible	1.4x10 ⁶	low or negligible
Amides or nitrogenous compounds				no exposure		no exposure
Organic acids or salts	1.2x10 ⁴	low or negligible		no exposure		no exposure
Siloxanes	398	possible		no exposure		no exposure
Amides or nitrogenous compounds				no exposure		no exposure
Polyol derivatives				no exposure		no exposure
Hydrocarbons - low molecular weight						
Organophosphorus compounds	287	possible		no exposure		no exposure
Solvent-based Ink #S2 – Site 7						
BLUE						
Alcohols	20.9	possible	372	low or negligible	1.8x10 ⁶	low or negligible
Resins				no exposure		no exposure
Hydrocarbons - low molecular weight						
Alkyl acetates						
Alcohols	120	low or negligible	42.4	possible	2.1x10 ⁵	low or negligible
Alcohols	0.0081	clear	467	possible	2.3x10 ⁶	low or negligible
Pigments - organometallic				no exposure		no exposure
Pigments - organometallic		SAT		no exposure		no exposure
Polyol derivatives				no exposure		no exposure

Formulation	Occupational				General Population	
	Dermal		Inhalation		Inhalation	
	MOE ^{a,b}	Concern Level ^c	MOE	Concern Level	MOE	Concern Level
Amides or nitrogenous compounds				no exposure		no exposure
Organic acids or salts	2.0x10 ⁴	low or negligible		no exposure		no exposure
Siloxanes	635	possible		no exposure		no exposure
Amides or nitrogenous compounds				no exposure		no exposure
Organophosphorus compounds	457	possible		no exposure		no exposure
Hydrocarbons - low molecular weight						
GREEN						
Alcohols	20.9	possible	379	low or negligible	1.8x10 ⁶	low or negligible
Resins				no exposure		no exposure
Hydrocarbons - low molecular weight						
Alkyl acetates						
Pigments - inorganic				no exposure		no exposure
Alcohols	114	low or negligible	41.2	possible	2.0x10 ⁵	low or negligible
Alcohols	0.0095	clear	562	possible	2.7x10 ⁶	low or negligible
Pigments - organic				no exposure		no exposure
Polyol derivatives				no exposure		no exposure
Pigments - organometallic				no exposure		no exposure
Pigments - inorganic				no exposure		no exposure
Amides or nitrogenous compounds				no exposure		no exposure
Organic acids or salts	2.0x10 ⁴	low or negligible		no exposure		no exposure
Siloxanes	673	possible		no exposure		no exposure
Amides or nitrogenous compounds				no exposure		no exposure
Organophosphorus compounds	485	possible		no exposure		no exposure
Hydrocarbons - low molecular weight						
WHITE						
Pigments - inorganic				no exposure		no exposure
Resins				no exposure		no exposure
Alcohols	26.8	possible	196	low or negligible	9.6x10 ⁵	low or negligible
Hydrocarbons - low molecular weight						
Alcohols	0.01389	clear	332	possible	1.6x10 ⁶	low or negligible
Amides or nitrogenous compounds				no exposure		no exposure
Organic acids or salts	1.6x10 ⁴	low or negligible		no exposure		no exposure
Siloxanes	539	possible		no exposure		no exposure
Hydrocarbons - low molecular weight						
Alkyl acetates						
Alcohols	173	low or negligible	25.1	possible	1.2x10 ⁵	low or negligible
CYAN						
Alcohols	20.4	possible	439	low or negligible	2.1x10 ⁶	low or negligible

Formulation	Occupational				General Population	
	Dermal		Inhalation		Inhalation	
	MOE ^{a,b}	Concern Level ^c	MOE	Concern Level	MOE	Concern Level
Hydrocarbons - low molecular weight						
Resins				no exposure		no exposure
Pigments - organometallic				no exposure		no exposure
Alcohols	0.0085	clear	593	possible	2.9x10 ⁶	low or negligible
Alkyl acetates						
Alcohols	122	low or negligible	51.8	possible	2.5x10 ⁵	low or negligible
Amides or nitrogenous compounds				no exposure		no exposure
Organic acids or salts	1.9x10 ⁴	low or negligible		no exposure		no exposure
Siloxanes	623	possible		no exposure		no exposure
Amides or nitrogenous compounds				no exposure		no exposure
Polyol derivatives				no exposure		no exposure
Hydrocarbons - low molecular weight						
Organophosphorus compounds	449	possible		no exposure		no exposure
MAGENTA						
Alcohols	21.3	possible	359	low or negligible	1.8x10 ⁶	low or negligible
Hydrocarbons - low molecular weight						
Resins				no exposure		no exposure
Pigments - organometallic		SAT		no exposure		no exposure
Alcohols	0.0052	clear	283	possible	1.4x10 ⁶	low or negligible
Alkyl acetates						
Alcohols	119	low or negligible	40.0	possible	1.9x10 ⁵	low or negligible
Amides or nitrogenous compounds				no exposure		no exposure
Organic acids or salts	1.9x10 ⁴	low or negligible		no exposure		no exposure
Siloxanes	639	possible		no exposure		no exposure
Amides or nitrogenous compounds				no exposure		no exposure
Polyol derivatives				no exposure		no exposure
Hydrocarbons - low molecular weight						
Organophosphorus compounds	460	possible		no exposure		no exposure
Solvent-based Ink #S2 – Site 10						
BLUE						
Alcohols	21.9	possible	0.458	clear	2.2x10 ⁶	low or negligible
Resins				no exposure		no exposure
Hydrocarbons - low molecular weight						
Alkyl acetates						
Alcohols	102	low or negligible	42.8	possible	2.1x10 ⁵	low or negligible
Alcohols	0.0084	clear	577	possible	2.8x10 ⁶	low or negligible
Pigments - organometallic				no exposure		no exposure
Pigments - organometallic		SAT		no exposure		no exposure
Polyol derivatives				no exposure		no exposure

Formulation	Occupational				General Population	
	Dermal		Inhalation		Inhalation	
	MOE ^{a,b}	Concern Level ^c	MOE	Concern Level	MOE	Concern Level
Amides or nitrogenous compounds				no exposure		no exposure
Organic acids or salts	2.0x10 ⁴	low or negligible		no exposure		no exposure
Siloxanes	664	possible		no exposure		no exposure
Amides or nitrogenous compounds				no exposure		no exposure
Organophosphorus compounds	478	possible		no exposure		no exposure
Hydrocarbons - low molecular weight						
GREEN						
Alcohols	20.1	possible	371	low or negligible	1.8x10 ⁶	low or negligible
Resins				no exposure		no exposure
Hydrocarbons - low molecular weight						
Alkyl acetates						
Pigments - inorganic				no exposure		no exposure
Alcohols	107	low or negligible	39.3	possible	1.9x10 ⁵	low or negligible
Alcohols	0.0091	clear	551	possible	2.7x10 ⁶	low or negligible
Pigments - organic				no exposure		no exposure
Polyol derivatives				no exposure		no exposure
Pigments - organometallic				no exposure		no exposure
Pigments - inorganic				no exposure		no exposure
Amides or nitrogenous compounds				no exposure		no exposure
Organic acids or salts	2.0x10 ⁴	low or negligible		no exposure		no exposure
Siloxanes	647	possible		no exposure		no exposure
Amides or nitrogenous compounds				no exposure		no exposure
Organophosphorus compounds	466	possible		no exposure		no exposure
Hydrocarbons - low molecular weight						
WHITE						
Pigments - inorganic				no exposure		no exposure
Resins				no exposure		no exposure
Alcohols	28.4	possible	222	low or negligible	1.1x10 ⁶	low or negligible
Hydrocarbons - low molecular weight						
Alcohols	0.01485	clear	376	possible	1.8x10 ⁶	low or negligible
Amides or nitrogenous compounds				no exposure		no exposure
Organic acids or salts	1.7x10 ⁴	low or negligible		no exposure		no exposure
Siloxanes	573	possible		no exposure		no exposure
Hydrocarbons - low molecular weight						
Alkyl acetates						
Alcohols	137	low or negligible	21.2	possible	1.0x10 ⁵	low or negligible
CYAN						
Alcohols	22.9	possible	455	low or negligible	2.2x10 ⁶	low or negligible

Formulation	Occupational				General Population	
	Dermal		Inhalation		Inhalation	
	MOE ^{a,b}	Concern Level ^c	MOE	Concern Level	MOE	Concern Level
Hydrocarbons - low molecular weight						
Resins				no exposure		no exposure
Pigments - organometallic				no exposure		no exposure
Alcohols	0.0095	clear	614	possible	3.0x10 ⁶	low or negligible
Alkyl acetates						
Alcohols	189	low or negligible	74.8	possible	3.6x10 ⁵	low or negligible
Amides or nitrogenous compounds				no exposure		no exposure
Organic acids or salts	2.1x10 ⁴	low or negligible		no exposure		no exposure
Siloxanes	697	possible		no exposure		no exposure
Amides or nitrogenous compounds				no exposure		no exposure
Polyol derivatives				no exposure		no exposure
Hydrocarbons - low molecular weight						
Organophosphorus compounds	502	possible		no exposure		no exposure
Propylene glycol ethers	133	low or negligible	52.7	possible	2.6x10 ⁵	low or negligible
Propylene glycol ethers		SAT		SAT		SAT
MAGENTA						
Alcohols	24.4	possible	435	low or negligible	2.1x10 ⁶	low or negligible
Hydrocarbons - low molecular weight						
Resins				no exposure		no exposure
Pigments - organometallic		SAT		no exposure		no exposure
Alcohols	0.0059	clear	343	possible	1.7x10 ⁶	low or negligible
Alkyl acetates						
Alcohols	92.1	possible	32.6	possible	1.6x10 ⁵	low or negligible
Amides or nitrogenous compounds				no exposure		no exposure
Organic acids or salts	2.2x10 ⁴	low or negligible		no exposure		no exposure
Siloxanes	733	possible		no exposure		no exposure
Amides or nitrogenous compounds				no exposure		no exposure
Polyol derivatives				no exposure		no exposure
Hydrocarbons - low molecular weight						
Organophosphorus compounds	527	possible		no exposure		no exposure
Propylene glycol ethers	672	low or negligible	238	low or negligible	1.2x10 ⁶	low or negligible
Propylene glycol ethers		SAT		SAT		SAT
Water-based Ink #W1 – Site 4						
BLUE						
Acrylic acid polymers				no exposure		no exposure
Pigments - organometallic				no exposure		no exposure
Alcohols	393	low or negligible	258	low or negligible	9.4x10 ⁵	low or negligible
Water						
Pigments - organic				no exposure		no exposure
Ethylene glycol ethers	1005.025	low or negligible	165	low or negligible	9.2x10 ⁵	low or negligible

Formulation	Occupational				General Population	
	Dermal		Inhalation		Inhalation	
	MOE ^{a,b}	Concern Level ^c	MOE	Concern Level	MOE	Concern Level
Resins				no exposure		no exposure
Hydrocarbons - high molecular weight						
Acrylic acid polymers				no exposure		no exposure
Amides or nitrogenous compounds						
Alcohols	0.04658	clear	5000	low or negligible	1.8×10^7	low or negligible
GREEN						
Pigments - inorganic				no exposure		no exposure
Acrylic acid polymers				no exposure		no exposure
Pigments - organic				no exposure		no exposure
Acrylic acid polymers				no exposure		no exposure
Alcohols	577	low or negligible	450	low or negligible	1.6×10^6	low or negligible
Water						
Resins				no exposure		no exposure
Ethylene glycol ethers	1418	low or negligible	276	low or negligible	1.5×10^6	low or negligible
Hydrocarbons - high molecular weight						
Amides or nitrogenous compounds						
Alcohols	0.06912	clear	8813	low or negligible	3.2×10^7	low or negligible
WHITE						
Pigments - inorganic				no exposure		no exposure
Acrylic acid polymers				no exposure		no exposure
Water						
Resins				no exposure		no exposure
Alcohols	1045.957	low or negligible	158	low or negligible	5.7×10^5	low or negligible
Organic acids or salts	37.5	possible		no exposure		no exposure
Amides or nitrogenous compounds						
Ethylene glycol ethers				no exposure		no exposure
CYAN						
Pigments - organometallic				no exposure		no exposure
Acrylic acid polymers				no exposure		no exposure
Water						
Ethylene glycol ethers	712	low or negligible	235	low or negligible	1.3×10^6	low or negligible
Organic acids or salts	28.7	possible		no exposure		no exposure
Acrylic acid polymers				no exposure		no exposure
Acrylic acid polymers				no exposure		no exposure
Alcohols	1607	low or negligible	2114	low or negligible	7.7×10^6	low or negligible
Ethylene glycol ethers				no exposure		no exposure
Amides or nitrogenous compounds						
MAGENTA						
Pigments - organic				no exposure		no exposure
Acrylic acid polymers				no exposure		no exposure
Water						
Ethylene glycol ethers	704	low or negligible	227	low or negligible	1.3×10^6	low or negligible

Formulation	Occupational				General Population	
	Dermal		Inhalation		Inhalation	
	MOE ^{a,b}	Concern Level ^c	MOE	Concern Level	MOE	Concern Level
Acrylic acid polymers				no exposure		no exposure
Acrylic acid polymers				no exposure		no exposure
Organic acids or salts	39.2	possible		no exposure		no exposure
Amides or nitrogenous compounds						
Water-based Ink #W2 – Site 1						
BLUE						
Water						
Pigments - organometallic				no exposure		no exposure
Resins	745	low or negligible		no exposure		no exposure
Resins				no exposure		no exposure
Acrylic acid polymers				no exposure		no exposure
Pigments - organic				no exposure		no exposure
Pigments - organic				no exposure		no exposure
Ethylene glycol ethers				no exposure		no exposure
Inorganics		low or negligible ^f		no exposure		no exposure
Ethylene glycol ethers				no exposure		no exposure
Amides or nitrogenous compounds						
Hydrocarbons - high molecular weight						
Hydrocarbons - low molecular weight	5576	low or negligible	832	possible	3.0x10 ⁶	low or negligible
Hydrocarbons - high molecular weight						
Alcohols	7.5x10 ⁴	low or negligible	5.5x10 ⁴	low or negligible	20.0x10 ⁸	low or negligible
Ethylene glycol ethers	1.6x10 ⁵	low or negligible	2.9x10 ⁴	low or negligible	1.61x10 ⁸	low or negligible
Alcohols	825	low or negligible	606	low or negligible	2.2x10 ⁶	low or negligible
GREEN						
Water						
Resins	418	low or negligible		no exposure		no exposure
Pigments - organic				no exposure		no exposure
Acrylic acid polymers				no exposure		no exposure
Resins				no exposure		no exposure
Ethylene glycol ethers				no exposure		no exposure
Ethylene glycol ethers				no exposure		no exposure
Hydrocarbons - high molecular weight						
Amides or nitrogenous compounds						
Hydrocarbons - low molecular weight	3168	low or negligible	647	possible	2.4x10 ⁶	low or negligible
WHITE						
Water						
Acrylic acid polymers				no exposure		no exposure
Ethylene glycol ethers	9950	low or negligible	410	low or negligible	2.3x10 ⁶	low or negligible
Amides or nitrogenous compounds						
Alcohols	4737.977	low or negligible	781	low or negligible	2.9x10 ⁶	low or negligible

Formulation	Occupational				General Population	
	Dermal		Inhalation		Inhalation	
	MOE ^{a,b}	Concern Level ^c	MOE	Concern Level	MOE	Concern Level
Hydrocarbons - high molecular weight						
Pigments - inorganic				no exposure		no exposure
Alcohols	1.6x10 ⁴	low or negligible	2731	low or negligible	10.0x10 ⁶	low or negligible
CYAN						
Water						
Pigments - organometallic				no exposure		no exposure
Resins				no exposure		no exposure
Ethylene glycol ethers				no exposure		no exposure
Alcohols					7.8x10 ⁷	low or negligible
Ethylene glycol ethers	1.3x10 ⁴	low or negligible	1.1x10 ⁴	low or negligible	6.2x10 ⁷	low or negligible
Amides or nitrogenous compounds						
MAGENTA						
Water						
Resins	374	low or negligible		no exposure		no exposure
Acrylic acid polymers				no exposure		no exposure
Ethylene glycol ethers				no exposure		no exposure
Ethylene glycol ethers				no exposure		no exposure
Hydrocarbons - high molecular weight						
Amides or nitrogenous compounds						
Hydrocarbons - low molecular weight	2804	low or negligible	2068	low or negligible	7.5x10 ⁶	low or negligible
Pigments - organic				no exposure		no exposure
Alcohols					7.8x10 ⁷	low or negligible
Ethylene glycol ethers	1.2x10 ⁴	low or negligible	1.1x10 ⁴	low or negligible	6.2x10 ⁷	low or negligible
Water-based Ink #W3 – Site 2						
BLUE						
Water						
Acrylic acid polymers				no exposure		no exposure
Pigments - organic				no exposure		no exposure
Acrylic acid polymers				no exposure		no exposure
Amides or nitrogenous compounds						
Ethylene glycol ethers				no exposure		no exposure
Siloxanes	725	possible		no exposure		no exposure
Olefin polymers				no exposure		no exposure
Organic acids or salts	1304	low or negligible		no exposure		no exposure
Alcohols	2976	low or negligible	1336	low or negligible	4.9x10 ⁶	low or negligible
Amides or nitrogenous compounds						
Alcohols	1.38	clear	1.0x10 ⁵	low or negligible	3.7x10 ⁸	low or negligible
Polyfunctional aziridine				no exposure		no exposure
Other components						
GREEN						
Water						

Formulation	Occupational				General Population	
	Dermal		Inhalation		Inhalation	
	MOE ^{a,b}	Concern Level ^c	MOE	Concern Level	MOE	Concern Level
Acrylic acid polymers				no exposure		no exposure
Pigments - inorganic				no exposure		no exposure
Acrylic acid polymers				no exposure		no exposure
Amides or nitrogenous compounds						
Pigments - organic				no exposure		no exposure
Alcohols	0.02669	clear	1991	low or negligible	7.5x10 ⁶	low or negligible
Olefin polymers				no exposure		no exposure
Ethylene glycol ethers	2.2x10 ⁵	low or negligible	2524	low or negligible	1.4x10 ⁷	low or negligible
Siloxanes	862	possible		no exposure		no exposure
Organic acids or salts	774	low or negligible		no exposure		no exposure
Alcohols	5549	low or negligible	2530	low or negligible	9.2x10 ⁶	low or negligible
Amides or nitrogenous compounds						
Alcohols					2.1x10 ⁸	low or negligible
WHITE						
Pigments - inorganic				no exposure		no exposure
Water						
Acrylic acid polymers				no exposure		no exposure
Acrylic acid polymers				no exposure		no exposure
Amides or nitrogenous compounds						
Ethylene glycol ethers				no exposure		no exposure
Olefin polymers				no exposure		no exposure
Siloxanes	571	possible		no exposure		no exposure
Alcohols	1.3x10 ⁴	low or negligible	2358	low or negligible	8.6x10 ⁶	low or negligible
Organic acids or salts	686	low or negligible		no exposure		no exposure
Alcohols	3691	low or negligible	667	low or negligible	2.4x10 ⁶	low or negligible
Amides or nitrogenous compounds						
Alcohols	1.66	clear	4.9x10 ⁴	low or negligible	1.8x10 ⁸	low or negligible
CYAN						
Water						
Acrylic acid polymers				no exposure		no exposure
Pigments - organometallic				no exposure		no exposure
Acrylic acid polymers				no exposure		no exposure
Amides or nitrogenous compounds						
Olefin polymers				no exposure		no exposure
Ethylene glycol ethers				no exposure		no exposure
Siloxanes	408.998	possible		no exposure		no exposure
Propylene glycol ethers						
Alcohols				no exposure		no exposure
Organic acids or salts	613	low or negligible		no exposure		no exposure
Amides or nitrogenous compounds						
MAGENTA						
Water						

Formulation	Occupational				General Population	
	Dermal		Inhalation		Inhalation	
	MOE ^{a,b}	Concern Level ^c	MOE	Concern Level	MOE	Concern Level
Acrylic acid polymers				no exposure		no exposure
Acrylic acid polymers				no exposure		no exposure
Pigments - organometallic	327	low or negligible		no exposure		no exposure
Amides or nitrogenous compounds						
Ethylene glycol ethers				no exposure		no exposure
Olefin polymers				no exposure		no exposure
Siloxanes	510	possible		no exposure		no exposure
Propylene glycol ethers						
Organic acids or salts	843	low or negligible		no exposure		no exposure
Alcohols				no exposure		no exposure
Amides or nitrogenous compounds						
Alcohols	1.0x10 ⁵	low or negligible	6.8x10 ⁴	low or negligible	2.5x10 ⁸	low or negligible
Alcohols	1.03	clear	1.1x10 ⁵	low or negligible	4.1x10 ⁸	low or negligible
Water-based Ink #W3 – Site 3						
BLUE						
Water						
Acrylic acid polymers				no exposure		no exposure
Pigments - organic				no exposure		no exposure
Acrylic acid polymers				no exposure		no exposure
Amides or nitrogenous compounds						
Ethylene glycol ethers				no exposure		no exposure
Siloxanes	532	possible		no exposure		no exposure
Olefin polymers				no exposure		no exposure
Organic acids or salts	957	low or negligible		no exposure		no exposure
Alcohols	907	low or negligible	782	low or negligible	2.8x10 ⁶	low or negligible
Amides or nitrogenous compounds						
GREEN						
Water						
Acrylic acid polymers				no exposure		no exposure
Pigments - inorganic				no exposure		no exposure
Acrylic acid polymers				no exposure		no exposure
Amides or nitrogenous compounds						
Pigments - organic				no exposure		no exposure
Alcohols	0.01928	clear	2063	low or negligible	7.5x10 ⁶	low or negligible
Olefin polymers						no exposure
Ethylene glycol ethers	1.5x10 ⁴	low or negligible	2524	low or negligible	1.4x10 ⁸	low or negligible
Siloxanes	601	possible		no exposure		no exposure
Organic acids or salts	541	low or negligible		no exposure		no exposure
Amides or nitrogenous compounds						
WHITE						
Pigments - inorganic				no exposure		no exposure
Water						

Formulation	Occupational				General Population	
	Dermal		Inhalation		Inhalation	
	MOE ^{a,b}	Concern Level ^c	MOE	Concern Level	MOE	Concern Level
Acrylic acid polymers				no exposure		no exposure
Acrylic acid polymers				no exposure		no exposure
Amides or nitrogenous compounds						
Ethylene glycol ethers				no exposure		no exposure
Olefin polymers				no exposure		no exposure
Siloxanes	541	possible		no exposure		no exposure
Alcohols	1.2x10 ⁴	low or negligible	1656	low or negligible	6.1x10 ⁶	low or negligible
Organic acids or salts	649	low or negligible		no exposure		no exposure
Extender						
Alcohols	1314	low or negligible	176	low or negligible	6.4x10 ⁵	low or negligible
Amides or nitrogenous compounds						
CYAN						
Water						
Acrylic acid polymers				no exposure		no exposure
Pigments - organometallic				no exposure		no exposure
Acrylic acid polymers				no exposure		no exposure
Amides or nitrogenous compounds						
Olefin polymers				no exposure		no exposure
Ethylene glycol ethers				no exposure		no exposure
Siloxanes	388	possible		no exposure		no exposure
Propylene glycol ethers						
Alcohols				no exposure		no exposure
Organic acids or salts	583	low or negligible		no exposure		no exposure
Amides or nitrogenous compounds						
MAGENTA						
Water						
Acrylic acid polymers				no exposure		no exposure
Acrylic acid polymers				no exposure		no exposure
Pigments - organometallic	240	low or negligible		no exposure		no exposure
Amides or nitrogenous compounds						
Ethylene glycol ethers				no exposure		no exposure
Olefin polymers				no exposure		no exposure
Siloxanes	376	possible		no exposure		no exposure
Propylene glycol ethers						
Organic acids or salts	620	low or negligible		no exposure		no exposure
Alcohols				no exposure		no exposure
Ethylene glycol ethers	8000	low or negligible	809	low or negligible	3.0x10 ⁶	low or negligible
Amides or nitrogenous compounds						
Water-based Ink #W4 – Site 9A						
BLUE						
Water						

Formulation	Occupational				General Population	
	Dermal		Inhalation		Inhalation	
	MOE ^{a,b}	Concern Level ^c	MOE	Concern Level	MOE	Concern Level
Pigments - organometallic				no exposure		no exposure
Acrylic acid polymers				no exposure		no exposure
Resins				no exposure		no exposure
Pigments - organometallic				no exposure		no exposure
Alcohols	0.0084	clear	2369	low or negligible	8.6x10 ⁶	low or negligible
Propylene glycol ethers	888	low or negligible	1523	low or negligible	5.6x10 ⁶	low or negligible
Propylene glycol ethers	581	low or negligible	997	low or negligible	3.7x10 ⁶	low or negligible
Hydrocarbons - high molecular weight						
Amides or nitrogenous compounds	224	possible	386	possible	2.1x10 ⁶	low or negligible
Siloxanes				no exposure		no exposure
Alcohols				no exposure		no exposure
Amides or nitrogenous compounds	2.2x10 ⁵	low or negligible	3.9x10 ⁵	low or negligible	2.15x10 ⁹	low or negligible
Alcohols	1695	low or negligible	2916	low or negligible	1.1x10 ⁷	low or negligible
Amides or nitrogenous compounds						
GREEN						
Water						
Pigments - inorganic				no exposure		no exposure
Acrylic acid polymers				no exposure		no exposure
Alcohols	865	low or negligible	1553	low or negligible	5.7x10 ⁶	low or negligible
Pigments - organic				no exposure		no exposure
Resins				no exposure		no exposure
Pigments - organometallic				no exposure		no exposure
Pigments - inorganic				no exposure		no exposure
Alcohols	0.0172	clear	5059	low or negligible	1.8x10 ⁷	low or negligible
Amides or nitrogenous compounds	5.7x10 ⁴	low or negligible	1.0x10 ⁵	low or negligible	5.71x10 ⁸	low or negligible
Amides or nitrogenous compounds						
Hydrocarbons - high molecular weight						
Amides or nitrogenous compounds	229	possible	412	possible	2.3x10 ⁶	low or negligible
Siloxanes				no exposure		no exposure
Alcohols				no exposure		no exposure
Amides or nitrogenous compounds						
WHITE						
Pigments - inorganic				no exposure		no exposure
Water						
Acrylic acid polymers				no exposure		no exposure
Inorganics		low or negligible ^f		no exposure		no exposure
Alcohols	0.01442	clear	515	possible	1.9x10 ⁶	low or negligible
Alcohols	2363	low or negligible	515	low or negligible	1.9x10 ⁶	low or negligible
Amides or nitrogenous compounds						

Formulation	Occupational				General Population	
	Dermal		Inhalation		Inhalation	
	MOE ^{a,b}	Concern Level ^c	MOE	Concern Level	MOE	Concern Level
Hydrocarbons - high molecular weight						
Amides or nitrogenous compounds	192	possible	41.9	clear	2.3x10 ⁵	low or negligible
Siloxanes				no exposure		no exposure
Alcohols				no exposure		no exposure
CYAN						
Water						
Pigments - organometallic				no exposure		no exposure
Acrylic acid polymers				no exposure		no exposure
Resins				no exposure		no exposure
Alcohols	0.006	clear	1475	low or negligible	5.4x10 ⁶	low or negligible
Propylene glycol ethers	672	low or negligible	1004	low or negligible	3.7x10 ⁶	low or negligible
Propylene glycol ethers	401	low or negligible		no exposure		no exposure
Alcohols	238	low or negligible	1.8x10 ⁴	low or negligible	6.5x10 ⁷	low or negligible
Hydrocarbons - high molecular weight						
Amides or nitrogenous compounds	164	possible	244	possible	1.4x10 ⁶	low or negligible
Siloxanes				no exposure		no exposure
Alcohols				no exposure		no exposure
Amides or nitrogenous compounds	2.8x10 ⁵	low or negligible	4.1x10 ⁵	low or negligible	2.30x10 ⁹	low or negligible
Solids				no exposure		no exposure
Ethylene glycol ethers	no exp		no exp		no exp	
Hydrocarbon - high molecular weight						
Alcohols	1661	low or negligible	2472	low or negligible	9.0x10 ⁶	low or negligible
Amides or nitrogenous compounds						
MAGENTA						
Water						
Pigments - organometallic	112	low or negligible		no exposure		no exposure
Acrylic acid polymers				no exposure		no exposure
Alcohols	0.0098	clear	3554	low or negligible	1.3x10 ⁷	low or negligible
Alcohols	1112	low or negligible	2465	low or negligible	9.0x10 ⁶	low or negligible
Amides or nitrogenous compounds	3.3x10 ⁴	low or negligible	7.2x10 ⁴	low or negligible	40.0x10 ⁸	low or negligible
Amides or nitrogenous compounds	98.0	clear	217	possible	1.2x10 ⁶	low or negligible
Hydrocarbons - high molecular weight						
Siloxanes				no exposure		no exposure
Alcohols				no exposure		no exposure
Amides or nitrogenous compounds						
UV-cured Ink #U1 – Site 11						
BLUE						
Acrylated polymers		SAT		no exposure		no exposure

Formulation	Occupational				General Population	
	Dermal		Inhalation		Inhalation	
	MOE ^{a,b}	Concern Level ^c	MOE	Concern Level	MOE	Concern Level
Pigments - organic				no exposure		no exposure
Acrylated polymers	112	low or negligible		no exposure		no exposure
Aromatic esters						
Aromatic ketones				no exposure		no exposure
Aromatic ketones				no exposure		no exposure
Amides or nitrogenous compounds		SAT		SAT		SAT
Siloxanes				no exposure		no exposure
Olefin polymers				no exposure		no exposure
GREEN						
Acrylated polymers		SAT		no exposure		no exposure
Pigments - inorganic				no exposure		no exposure
Acrylated polymers	114	low or negligible		no exposure		no exposure
Aromatic esters						
Aromatic ketones				no exposure		no exposure
Aromatic ketones				no exposure		no exposure
Amides or nitrogenous compounds		SAT		SAT		SAT
Siloxanes				no exposure		no exposure
Olefin polymers				no exposure		no exposure
Acrylated polyols	630	possible	793	possible	1.99x10 ⁷	low or negligible
WHITE						
Acrylated polymers		SAT		no exposure		no exposure
Acrylated polymers		SAT		no exposure		no exposure
Acrylated polymers	187	low or negligible		no exposure		no exposure
Aromatic ketones				no exposure		no exposure
Aromatic esters						
Organophosphorus compounds				no exposure		no exposure
Amides or nitrogenous compounds		SAT		SAT		SAT
Siloxanes				no exposure		no exposure
Olefin polymers				no exposure		no exposure
Pigments - inorganic				no exposure		no exposure
Pigments - inorganic		SAT		no exposure		no exposure
CYAN						
Acrylated polymers		SAT		no exposure		no exposure
Pigments - organometallic				no exposure		no exposure
Acrylated polymers	112	low or negligible		no exposure		no exposure
Aromatic esters						
Aromatic ketones				no exposure		no exposure
Aromatic ketones				no exposure		no exposure
Amides or nitrogenous compounds		SAT		SAT		SAT
Siloxanes				no exposure		no exposure
Olefin polymers				no exposure		no exposure
MAGENTA						
Acrylated polymers		SAT		no exposure		no exposure

Formulation	Occupational				General Population	
	Dermal		Inhalation		Inhalation	
	MOE ^{a,b}	Concern Level ^c	MOE	Concern Level	MOE	Concern Level
Pigments - organometallic	112	low or negligible		no exposure		no exposure
Acrylated polymers	112	low or negligible		no exposure		no exposure
Aromatic esters						
Aromatics ketones				no exposure		no exposure
Aromatic ketones				no exposure		no exposure
Amides or nitrogenous compounds		SAT		SAT		SAT
Siloxanes				no exposure		no exposure
Olefin polymers				no exposure		no exposure
UV-cured Ink #U2 – Site 6						
BLUE						
Acrylated polymers		SAT		no exposure		no exposure
Acrylated polymers				no exposure		no exposure
Pigments - organometallic				no exposure		no exposure
Acrylated polyols						
Acrylated polyols	150	possible	188	possible	8.8x10 ⁵	low or negligible
Polyol derivatives				no exposure		no exposure
Acrylated polymers		SAT		no exposure		no exposure
Pigments - organic				no exposure		no exposure
Acrylated polyols	623	low or negligible		no exposure		no exposure
Aromatic ketones				no exposure		no exposure
Aromatic ketones						
Aromatic ketones				no exposure		no exposure
Olefin polymers				no exposure		no exposure
Alcohols				no exposure		no exposure
Aromatic ketones				no exposure		no exposure
GREEN						
Acrylated polymers		SAT		no exposure		no exposure
Acrylated polyols	231	low or negligible		no exposure		no exposure
Acrylated polyols						
Acrylated polymers				no exposure		no exposure
Pigments - inorganic				no exposure		no exposure
Polyol derivatives				no exposure		no exposure
Acrylated polyols	240	possible	572	possible	2.7x10 ⁶	low or negligible
Acrylated polymers		SAT		no exposure		no exposure
Pigments - organic				no exposure		no exposure
Aromatic ketones				no exposure		no exposure
Aromatic ketones						
Aromatic ketones				no exposure		no exposure
Olefin polymers				no exposure		no exposure
Alcohols				no exposure		no exposure
Aromatic ketones				no exposure		no exposure
WHITE						
Pigments - inorganic				no exposure		no exposure
Acrylated polyols	145	low or negligible		no exposure		no exposure
Acrylated polyols						

Formulation	Occupational				General Population	
	Dermal		Inhalation		Inhalation	
	MOE ^{a,b}	Concern Level ^c	MOE	Concern Level	MOE	Concern Level
Acrylated polyols	134	possible	44.4	clear	2.1x10 ⁵	low or negligible
Acrylated polymers		SAT		no exposure		no exposure
Organophosphorus compounds				no exposure		no exposure
Aromatic ketones				no exposure		no exposure
Aromatic ketones				no exposure		no exposure
Alcohols				no exposure		no exposure
Olefin polymers				no exposure		no exposure
Aromatic ketones						
Aromatic ketones				no exposure		no exposure
CYAN						
Acrylated polymers		SAT		no exposure		no exposure
Pigments - organometallic				no exposure		no exposure
Acrylated polyols	124	possible	373	possible	1.8x10 ⁶	low or negligible
Acrylated polymers				no exposure		no exposure
Acrylated polyols						
Polyol derivatives				no exposure		no exposure
Acrylated polymers		SAT		no exposure		no exposure
Aromatic ketones				no exposure		no exposure
Aromatic ketones						
Aromatic ketones				no exposure		no exposure
Olefin polymers				no exposure		no exposure
Alcohols				no exposure		no exposure
Aromatic ketones				no exposure		no exposure
Acrylated polyols	4545	low or negligible		no exposure		no exposure
MAGENTA						
Acrylated polymers		SAT		no exposure		no exposure
Pigments - organometallic	111	low or negligible		no exposure		no exposure
Acrylated polymers				no exposure		no exposure
Acrylated polyols						
Acrylated polyols	327	low or negligible		no exposure		no exposure
Polyol derivatives				no exposure		no exposure
Acrylated polymers		SAT		no exposure		no exposure
Acrylated polyols	168	possible	326	possible	1.5x10 ⁶	low or negligible
Aromatic ketones				no exposure		no exposure
Aromatic ketones						
Aromatic ketones				no exposure		no exposure
Olefin polymers				no exposure		no exposure
Alcohols				no exposure		no exposure
Aromatic ketones				no exposure		no exposure
UV-cured Ink #U3 – Site 8						
BLUE						
Acrylated polymers		SAT		no exposure		no exposure
Pigments - organic				no exposure		no exposure
Acrylated polyols		SAT		SAT		SAT
Aromatic esters						

Formulation	Occupational				General Population	
	Dermal		Inhalation		Inhalation	
	MOE ^{a,b}	Concern Level ^c	MOE	Concern Level	MOE	Concern Level
Aromatic ketones				no exposure		no exposure
Aromatic ketones				no exposure		no exposure
Amides or nitrogenous compounds		SAT		SAT		SAT
Siloxanes				no exposure		no exposure
Olefin polymers				no exposure		no exposure
GREEN						
Acrylated polymers		SAT		no exposure		no exposure
Pigments - inorganic				no exposure		no exposure
Acrylated polyols		SAT		SAT		SAT
Aromatic esters						
Aromatic ketones				no exposure		no exposure
Aromatic ketones				no exposure		no exposure
Amides or nitrogenous compounds		SAT		SAT		SAT
Siloxanes				no exposure		no exposure
Olefin polymers				no exposure		no exposure
WHITE						
Pigments - inorganic				no exposure		no exposure
Acrylated polymers		SAT		no exposure		no exposure
Acrylated polymers		SAT		no exposure		no exposure
Acrylated polymers		SAT		no exposure		no exposure
Aromatic esters						
Organophosphorus compounds				no exposure		no exposure
Amides or nitrogenous compounds		SAT		SAT		SAT
Siloxanes				no exposure		no exposure
Olefin polymers				no exposure		no exposure
Aromatic ketones				no exposure		no exposure
CYAN						
Acrylated polymers		SAT		no exposure		no exposure
Pigments - organometallic				no exposure		no exposure
Acrylated polyols		SAT		SAT		SAT
Aromatic esters						
Aromatic ketones				no exposure		no exposure
Aromatic ketones				no exposure		no exposure
Amides or nitrogenous compounds		SAT		SAT		SAT
Siloxanes				no exposure		no exposure
Olefin polymers				no exposure		no exposure
MAGENTA						
Acrylated polymers		SAT		no exposure		no exposure
Pigments - organic				no exposure		no exposure
Acrylated polyols		SAT		SAT		SAT
Aromatic esters						
Aromatic ketones				no exposure		no exposure
Aromatic ketones				no exposure		no exposure

Formulation	Occupational				General Population	
	Dermal		Inhalation		Inhalation	
	MOE ^{a,b}	Concern Level ^c	MOE	Concern Level	MOE	Concern Level
Amides or nitrogenous compounds		SAT		SAT		SAT
Siloxanes				no exposure		no exposure
Olefin polymers				no exposure		no exposure

^a A Margin of Exposure (MOE) or a Hazard Quotient (HQ) gives an estimate of the “margin of safety” between an estimated exposure level and the level at which adverse effects may occur. Hazard Quotient values below unity imply that adverse effects are very unlikely to occur. The more the Hazard Quotient exceeds unity, the greater the level of concern. High MOE values, such as values greater than 100 for a NOAEL-based MOE or 1000 for a LOAEL-based MOE, imply a low level of concern. As the MOE decreases, the level of concern increases.

^b The absence of HQ or MOE values in this table indicates that insufficient hazard data were available to calculate a HQ or MOE for that chemical.

^c The Concern Level is derived from a MOE or an HQ. Concern Levels for developmental toxicity were assessed by criteria presented in a memorandum from J. Seed to T. O'Bryan, “Criteria for 8(e) CAP Submissions”, USEPA, OPPTS, March 25, 1994.

^d No level of concern could be assigned to this chemical due to no exposure.

^e The OPPT Structure Activity Team has indicated a concern for developmental toxicity for this chemical. SAT concerns are provided only for those chemicals with insufficient developmental hazard data available. It should be noted that SAT-based developmental toxicity concerns were not ranked as were systemic toxicity concerns; the SAT indicated only if a concern for developmental toxicity existed for a given chemical.

^f A developmental MOE was not available for this chemical due to a lack of hazard data for this route of exposure; however, the risk associated with dermal exposure to this chemical is expected to be very low.

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Appendix 3-K (Risk Chapter) **Summary of Occupational** **Systemic Toxicity Risk — Dermal^a**

Ink system, color	Number of chemicals						No exposure	No data
	Risk-based evaluation ^b			SAT-based evaluation ^c				
	low	possible	clear	low	low-moderate	moderate		
Solvent-based Ink #S1 - Site 9B								
BLUE (15) ^d	4	1	2	2	5	1	-	-
GREEN (12)	2	3	2	2	3	-	-	-
WHITE (13)	1	4	1	1	5	1	-	-
CYAN (9)	1	2	2	2	2	-	-	-
MAGENTA (14)	1	3	3	2	4	-	-	1
TOTALS (63)	9/63 (14%)	13/63 (21%)	10/63 (16%)	9/63 (14%)	19/63 (30%)	2/63 (3%)	-	1/63 (2%)
Solvent-based Ink #S2 - Site 5								
BLUE (15)	3	3	2	2	5	-	-	-
GREEN (17)	5	3	2	2	5	-	-	-
WHITE (10)	2	4	-	2	2	-	-	-
CYAN (14)	3	3	2	2	4	-	-	-
MAGENTA (14)	2	3	2	2	5	-	-	-
TOTALS (70)	15/70 (21%)	16/70 (23%)	8/70 (11%)	10/70 (14%)	21/70 (30%)	-	-	-
Solvent-based Ink #S2 - Site 7								
BLUE (15)	3	3	2	2	5	-	-	-
GREEN (17)	5	3	2	2	5	-	-	-
WHITE (11)	3	3	1	2	2	-	-	-
CYAN (14)	3	3	2	2	4	-	-	-
MAGENTA (14)	2	3	2	2	5	-	-	-
TOTALS (71)	16/71 (23%)	15/71 (21%)	9/71 (13%)	10/71 (14%)	21/71 (30%)	-	-	-
Solvent-based Ink #S2 - Site 10								
BLUE (15)	4	2	2	2	5	-	-	-
GREEN (17)	5	3	2	2	5	-	-	-
WHITE (11)	3	3	1	2	2	-	-	-
CYAN (16)	4	2	3	2	5	-	-	-
MAGENTA (16)	3	3	2	2	6	-	-	-
TOTALS (75)	19/75 (25%)	13/75 (17%)	10/75 (13%)	10/75 (13%)	23/75 (31%)	-	-	-

Ink system, color	Number of chemicals						No exposure	No data
	Risk-based evaluation ^b			SAT-based evaluation ^c				
	low	possible	clear	low	low-moderate	moderate		
Water-based Ink #W1 - Site 4								
BLUE (10)	1	2	3	2	2	-	-	-
GREEN (10)	-	3	3	1	3	-	-	-
WHITE (7)	-	1	2	1	3	-	-	-
CYAN (9)	2	-	3	-	4	-	-	-
MAGENTA (7)	-	-	3	-	4	-	-	-
TOTALS (43)	3/43 (7%)	6/43 (14%)	14/43 (33%)	4/43 (9%)	16/43 (37%)	-	-	-
Water-based Ink #W2 - Site 1								
BLUE (16)	7	2	1	3	2	1	-	-
GREEN (9)	3	1	-	1	3	1	-	-
WHITE (7)	1	3	2	-	1	-	-	-
CYAN (6)	1	2	1	1	1	-	-	-
MAGENTA (10)	3	1	2	1	2	1	-	-
TOTALS (48)	15/48 (31%)	9/48 (19%)	6/48 (13%)	6/48 (13%)	9/48 (19%)	3/48 (6%)	-	-
Water-based Ink #W3 - Site 2								
BLUE (13)	2	1	2	1	5	-	-	2
GREEN (13)	1	3	3	1	4	-	-	1
WHITE (12)	3	2	2	-	5	-	-	-
CYAN (11)	2	2	1	-	6	-	-	-
MAGENTA (13)	3	2	2	-	6	-	-	-
TOTALS (62)	11/62 (18%)	10/62 (16%)	10/62 (16%)	2/62 (3%)	26/62 (42%)	-	-	3/62 (5%)
Water-based Ink #W3 - Site 3								
BLUE (10)	0	1	3	1	5	-	-	-
GREEN (11)	1	3	2	-	5	-	-	-
WHITE (12)	1	3	2	-	5	-	-	1
CYAN (11)	2	2	1	-	6	-	-	-
MAGENTA (12)	2	2	2	-	6	-	-	-
TOTALS (56)	6/56 (11%)	11/56 (20%)	10/56 (18%)	1/56 (2%)	27/56 (48%)	-	-	1/56 (2%)
Water-based Ink #W4 - Site 9A								
BLUE (14)	3	3	2	1	5	-	-	-
GREEN (15)	4	3	2	1	5	-	-	-
WHITE (10)	2	2	2	-	4	-	-	-
CYAN (17)	4	3	2	1	5	-	-	2
MAGENTA (10)	2	2	2	-	4	-	-	-
TOTALS (66)	15/66 (23%)	13/66 (20%)	10/66 (15%)	3/66 (5%)	23/66 (35%)	-	-	2/66 (3%)

Ink system, color	Number of chemicals						No exposure	No data
	Risk-based evaluation ^b			SAT-based evaluation ^c				
	low	possible	clear	low	low-moderate	moderate		
UV-cured Ink #U1 - Site 11								
BLUE (9)	1	-	-	1	6	1	-	-
GREEN (10)	1	1	-	-	6	2	-	-
WHITE (11)	1	1	-	-	8	1	-	-
CYAN (9)	2	-	-	-	6	1	-	-
MAGENTA (9)	1	-	1	-	7	1	-	-
TOTALS (48)	6/48 (13%)	2/48 (4%)	1/48 (2%)	1/48 (2%)	32/48 (67%)	6/48 (13%)	-	-
UV-cured Ink #U2 - Site 6								
BLUE (15)	2	2	3	4	3	1	-	-
GREEN (15)	1	3	3	3	4	1	-	-
WHITE (12)	1	3	3	2	2	1	-	-
CYAN (14)	2	2	3	3	3	1	-	-
MAGENTA (14)	1	2	4	3	3	1	-	-
TOTALS (70)	7/70 (10%)	12/70 (17%)	16/70 (23%)	15/70 (21%)	15/70 (21%)	5/70 (7%)	-	-
UV-cured Ink #U3 - Site 8								
BLUE (9)	1	-	-	1	5	2	-	-
GREEN (9)	1	1	-	-	5	2	-	-
WHITE (10)	-	2	-	-	7	1	-	-
CYAN (9)	2	-	-	-	5	2	-	-
MAGENTA (9)	1	-	-	1	5	2	-	-
TOTALS (46)	5/46 (11%)	3/46 (7%)	-	2/46 (4%)	27/46 (59%)	9/46 (20%)	-	-

^a The numbers in each column show the number of chemicals within each risk-based or SAT-based classification.

^b Criteria for level of concern are presented in Table 3.15 (page 3-48).

^c SAT concern levels are generated by the OPPT Structure Activity Team to predict toxicity based on analog data and/or structure-activity considerations. SAT concern levels are provided for chemicals with insufficient systemic hazard data available. Criteria for SAT concern levels are presented on page 3-49.

^d Number of chemicals in the color.

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Appendix 3-L (Risk Chapter)

Summary of Occupational Systemic Toxicity Risk — Inhalation^a

Ink system, color	Number of chemicals						No exposure	No data
	Risk-based evaluation ^b			SAT-based evaluation ^c				
	low	possible	clear	low	low-moderate	moderate		
Solvent-based Ink #S1 - Site 9B								
BLUE (15) ^d	1	1	2	-	1	-	10	-
GREEN (12)	1	1	3	1	-	-	6	-
WHITE (13)	0	1	3	-	2	-	7	-
CYAN (9)	-	1	3	-	1	-	4	-
MAGENTA (14)	1	2	3	-	1	-	6	1
TOTALS (63)	3/63 (5%)	6/63 (10%)	14/63 (22%)	1/63 (2%)	5/63 (8%)	-	33/63 (52%)	1/63 (2%)
Solvent-based Ink #S2 - Site 5								
BLUE (15)	-	1	3	-	2	-	9	-
GREEN (17)	-	1	3	-	2	-	11	-
WHITE (10)	-	1	2	-	2	-	5	-
CYAN (14)	-	1	3	-	2	-	8	-
MAGENTA (14)	-	1	3	-	2	-	8	-
TOTALS (70)	-	5/70 (7%)	14/70 (20%)	-	10/70 (14%)	-	41/70 (59%)	-
Solvent-based Ink #S2 - Site 7								
BLUE (15)	-	1	3	-	2	-	9	-
GREEN (17)	-	1	3	-	2	-	11	-
WHITE (11)	-	1	3	-	2	-	5	-
CYAN (14)	-	1	3	-	2	-	8	-
MAGENTA (14)	-	1	3	-	2	-	8	-
TOTALS (71)	-	5/71 (7%)	15/71 (21%)	-	10/71 (14%)	-	41/71 (58%)	-
Solvent-based Ink #S2 - Site 10								
BLUE (15)	-	1	3	-	2	-	9	-
GREEN (17)	-	1	3	-	2	-	11	-
WHITE (11)	-	1	3	-	2	-	5	-
CYAN (16)	-	1	4	-	3	-	8	-
MAGENTA (16)	-	1	4	-	3	-	8	-
TOTALS (75)	-	5/75 (7%)	17/75 (23%)	-	12/75 (16%)	-	41/75 (55%)	-

Ink system, color	Number of chemicals						No exposure	No data
	Risk-based evaluation ^b			SAT-based evaluation ^c				
	low	possible	clear	low	low-moderate	moderate		
Water-based Ink #W1 - Site 4								
BLUE (10)	-	1	4	-	-	-	5	-
GREEN (10)	-	1	4	-	-	-	5	-
WHITE (7)	-	-	2	-	-	-	5	-
CYAN (9)	-	-	3	-	-	-	6	-
MAGENTA (7)	-	-	2	-	-	-	5	-
TOTALS (43)	-	2/43 (5%)	15/43 (35%)	-	-	-	26/43 (60%)	-
Water-based Ink #W2 - Site 1								
BLUE (16)	3	1	3	-	-	-	9	-
GREEN (9)	2	-	1	-	-	-	6	-
WHITE (7)	1	-	4	-	-	-	2	-
CYAN (6)	-	1	2	-	-	-	3	-
MAGENTA (10)	2	1	2	-	-	-	5	-
TOTALS (48)	8/48 (17%)	3/48 (6%)	12/48 (25%)	-	-	-	25/48 (52%)	-
Water-based Ink #W3 - Site 2								
BLUE (13)	-	1	3	-	-	-	8	1
GREEN (13)	-	1	4	-	-	-	7	1
WHITE (12)	-	1	4	-	-	-	7	-
CYAN (11)	1	1	1	-	-	-	8	-
MAGENTA (13)	2	1	2	-	-	-	8	-
TOTALS (62)	3/62 (5%)	5/62 (8%)	14/62 (23%)	-	-	-	38/62 (61%)	2/62 (3%)
Water-based Ink #W3 - Site 3								
BLUE (10)	-	-	3	-	-	-	7	-
GREEN (11)	1	-	3	-	-	-	7	-
WHITE (12)	-	-	4	-	-	-	7	1
CYAN (11)	1	1	1	-	-	-	8	-
MAGENTA (12)	2	1	1	-	-	-	8	-
TOTALS (56)	4/56 (7%)	2/56 (4%)	12/56 (21%)	-	-	-	37/56 (66%)	1/56 (2%)
Water-based Ink #W4 - Site 9A								
BLUE (14)	1	3	3	-	1	-	6	-
GREEN (15)	1	2	3	-	1	-	8	-
WHITE (10)	-	-	4	-	1	-	5	-
CYAN (17)	2	2	3	-	1	-	8	1
MAGENTA (10)	1	1	3	-	1	-	4	-
TOTALS (66)	5/66 (8%)	8/66 (12%)	16/66 (24%)	-	5/66 (8%)	-	31/66 (47%)	1/66 (2%)

Ink system, color	Number of chemicals						No exposure	No data
	Risk-based evaluation ^b			SAT-based evaluation ^c				
	low	possible	clear	low	low-moderate	moderate		
UV-cured Ink #U1 - Site 11								
BLUE (9)	-	-	-	-	1	1	7	-
GREEN (10)	-	-	-	-	1	2	7	-
WHITE (11)	-	-	-	-	1	1	9	-
CYAN (9)	-	-	-	-	1	1	7	-
MAGENTA (9)	-	-	-	-	1	1	7	-
TOTALS (48)	-	-	-	-	5/48 (10%)	6/48 (13%)	37/48 (77%)	-
UV-cured Ink #U2 - Site 6								
BLUE (15)	-	1	1	-	-	1	12	-
GREEN (15)	1	-	1	-	-	1	12	-
WHITE (12)	-	1	1	-	-	1	9	-
CYAN (14)	1	-	1	-	-	1	11	-
MAGENTA (14)	1	-	1	-	-	1	11	-
TOTALS (70)	3/70 (4%)	2/70 (3%)	5/70 (7%)	-	-	5/70 (7%)	55/70 (79%)	-
UV-cured Ink #U3 - Site 8								
BLUE (9)	-	-	-	-	1	2	6	-
GREEN (9)	-	-	-	-	1	2	6	-
WHITE (10)	-	-	-	-	1	1	8	-
CYAN (9)	-	-	-	-	1	2	6	-
MAGENTA (9)	-	-	-	-	1	2	6	-
TOTALS (46)	-	-	-	-	5/46 (11%)	9/46 (20%)	32/46 (70%)	-

^a The numbers in each column show the number of chemicals within each risk-based or SAT-based classification.

^b Criteria for level of concern are presented in Table 3.15 (page 3-48).

^c SAT concern levels are generated by the OPPT Structure Activity Team to predict toxicity based on analog data and/or structure-activity considerations. SAT concern levels are provided for chemicals with insufficient systemic hazard data available. Criteria for SAT concern levels are presented on page 3-49.

^d Number of chemicals in the color.

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Appendix 3-M (Risk Chapter) **Summary of Occupational** **Developmental Toxicity Risk — Dermal^a**

Ink system, color	Number of chemicals				No exposure	No data
	Risk-based evaluation ^b			SAT developmental concern ^c		
	low	possible	clear			
Solvent-based Ink #S1 - Site 9B						
BLUE (15) ^d	3	1	1	3	-	7
GREEN (12)	4	1	1	-	-	6
WHITE (13)	2	1	1	1	-	8
CYAN (9)	1	2	1	-	-	5
MAGENTA (14)	2	2	2	1	-	7
TOTALS (63)	12/63 (19%)	7/63 (11%)	6/63 (10%)	5/63 (8%)	-	33/63 (52%)
Solvent-based Ink #S2 - Site 5						
BLUE (15)	2	2	2	1	-	8
GREEN (17)	2	2	2	-	-	11
WHITE (10)	1	2	1	-	-	6
CYAN (14)	2	2	2	-	-	8
MAGENTA (14)	2	3	1	1	-	7
TOTALS (70)	9/70 (13%)	11/70 (16%)	8/70 (11%)	2/70 (3%)	-	40/70 (57%)
Solvent-based Ink #S2 - Site 7						
BLUE (15)	2	3	1	1	-	8
GREEN (17)	2	3	1	-	-	11
WHITE (11)	2	2	1	-	-	6
CYAN (14)	2	3	1	-	-	8
MAGENTA (14)	2	3	1	1	-	7
TOTALS (71)	10/71 (14%)	14/71 (20%)	5/71 (7%)	2/71 (3%)	-	40/71 (56%)
Solvent-based Ink #S2 - Site 10						
BLUE (15)	2	3	1	1	-	8
GREEN (17)	2	3	1	-	-	11
WHITE (11)	2	2	1	-	-	6
CYAN (16)	3	3	1	1	-	8
MAGENTA (16)	2	4	1	2	-	7
TOTALS (75)	11/75 (15%)	15/75 (20%)	5/75 (7%)	4/75 (5%)	-	40/75 (53%)

Ink system, color	Number of chemicals				No exposure	No data
	Risk-based evaluation ^b			SAT developmental concern ^c		
	low	possible	clear			
Water-based Ink #W1 - Site 4						
BLUE (10)	2	-	1	-	-	7
GREEN (10)	2	-	1	-	-	7
WHITE (7)	1	1	-	-	-	5
CYAN (9)	2	1	-	-	-	6
MAGENTA (7)	1	1	-	-	-	5
TOTALS (43)	8/43 (19%)	3/43 (7%)	2/43 (5%)	-	-	30/43 (70%)
Water-based Ink #W2 - Site 1						
BLUE (16)	6	-	-	-	-	10
GREEN (9)	2	-	-	-	-	7
WHITE (7)	3	-	-	-	-	4
CYAN (6)	1	-	-	-	-	5
MAGENTA (10)	3	-	-	-	-	7
TOTALS (48)	15/48 (31%)	-	-	-	-	33/48 (69%)
Water-based Ink #W3 - Site 2						
BLUE (13)	2	1	1	-	-	9
GREEN (13)	3	1	1	-	-	8
WHITE (12)	3	1	1	-	-	7
CYAN (11)	1	1	-	-	-	9
MAGENTA (13)	3	1	1	-	-	8
TOTALS (62)	12/62 (19%)	5/62 (8%)	4/62 (6%)	-	-	41/62 (66%)
Water-based Ink #W3 - Site 3						
BLUE (10)	2	1	-	-	-	7
GREEN (11)	2	1	1	-	-	7
WHITE (12)	3	1	-	-	-	8
CYAN (11)	1	1	-	-	-	9
MAGENTA (12)	3	1	-	-	-	8
TOTALS (56)	11/56 (20%)	5/56 (9%)	1/56 (2%)	-	-	39/56 (70%)
Water-based Ink #W4 - Site 9A						
BLUE (14)	4	1	1	-	-	8
GREEN (15)	2	1	1	-	-	11
WHITE (10)	2	1	1	-	-	6
CYAN (17)	5	1	1	-	-	10
MAGENTA (10)	3	-	2	-	-	5
TOTALS (66)	16/66 (24%)	4/66 (6%)	6/66 (9%)	-	-	40/66 (61%)

Ink system, color	Number of chemicals				No exposure	No data
	Risk-based evaluation ^b			SAT developmental concern ^c		
	low	possible	clear			
UV-cured Ink #U1 - Site 11						
BLUE (9)	1	-	-	2	-	6
GREEN (10)	1	1	-	2	-	6
WHITE (11)	1	-	-	4	-	6
CYAN (9)	1	-	-	2	-	6
MAGENTA (9)	2	-	-	2	-	5
TOTALS (48)	6/48 (13%)	1/48 (2%)	-	12/48 (25%)	-	29/48 (60%)
UV-cured Ink #U2 - Site 6						
BLUE (15)	1	1	-	2	-	11
GREEN (15)	1	1	-	2	-	11
WHITE (12)	1	1	-	1	-	9
CYAN (14)	1	1	-	2	-	10
MAGENTA (14)	2	1	-	2	-	9
TOTALS (70)	6/70 (9%)	5/70 (7%)	-	9/70 (13%)	-	50/70 (71%)
UV-cured Ink #U3 - Site 8						
BLUE (9)	-	-	-	3	-	6
GREEN (9)	-	-	-	3	-	6
WHITE (10)	-	-	-	4	-	6
CYAN (9)	-	-	-	3	-	6
MAGENTA (9)	-	-	-	3	-	6
TOTALS (46)	-	-	-	16/46 (35%)	-	30/46 (65%)

^a The numbers in each column show the number of chemicals within each risk-based or SAT-based classification.

^b Criteria for level of concern are presented in Table 3.15 (page 3-48).

^c SAT concern levels are generated by the OPPT Structure Activity Team to predict toxicity based on analog data and/or structure-activity considerations. SAT concern levels are provided for chemicals with insufficient systemic hazard data available.

^d Number of chemicals in the color.

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Appendix 3-N (Risk Chapter)

Summary of Occupational Developmental Toxicity Risk — Inhalation^a

Ink system, color	Number of chemicals				No exposure	No data
	Risk-based evaluation ^b			SAT developmental concern ^c		
	low	possible	clear			
Solvent-based Ink #S1 - Site 9B						
BLUE (15) ^d	2	1	-	-	10	2
GREEN (12)	3	2	-	-	6	1
WHITE (13)	1	2	-	-	7	3
CYAN (9)	2	2	-	-	4	1
MAGENTA (14)	4	1	-	-	6	3
TOTALS (63)	12/63 (19%)	8/63 (13%)	-	-	33/63 (52%)	10/63 (16%)
Solvent-based Ink #S2 - Site 5						
BLUE (15)	2	1	-	-	9	3
GREEN (17)	2	1	-	-	11	3
WHITE (10)	-	2	-	-	5	3
CYAN (14)	2	1	-	-	8	3
MAGENTA (14)	2	1	-	-	8	3
TOTALS (70)	8/70 (11%)	6/70 (9%)	-	-	41/70 (59%)	15/70 (21%)
Solvent-based Ink #S2 - Site 7						
BLUE (15)	1	2	-	-	9	3
GREEN (17)	1	2	-	-	11	3
WHITE (11)	1	2	-	-	5	3
CYAN (14)	1	2	-	-	8	3
MAGENTA (14)	1	2	-	-	8	3
TOTALS (71)	5/71 (7%)	10/71 (14%)	-	-	41/71 (58%)	15/71 (21%)
Solvent-based Ink #S2 - Site 10						
BLUE (15)	-	2	1	-	9	3
GREEN (17)	1	2	-	-	11	3
WHITE (11)	1	2	-	-	5	3
CYAN (16)	1	3	-	1	8	3
MAGENTA (16)	2	2	-	1	8	3
TOTALS (75)	5/75 (7%)	11/75 (15%)	1/75 (1%)	2/75 (3%)	41/75 (55%)	15/75 (20%)

Ink system, color	Number of chemicals				No exposure	No data
	Risk-based evaluation ^b			SAT developmental concern ^c		
	low	possible	clear			
Water-based Ink #W1 - Site 4						
BLUE (10)	3	-	-	-	5	2
GREEN (10)	3	-	-	-	5	2
WHITE (7)	1	-	-	-	5	1
CYAN (9)	2	-	-	-	6	1
MAGENTA (7)	1	-	-	-	5	1
TOTALS (43)	10/43 (23%)	-	-	-	26/43 (60%)	7/43 (16%)
Water-based Ink #W2 - Site 1						
BLUE (16)	3	1	-	-	9	3
GREEN (9)	-	1	-	-	6	2
WHITE (7)	3	-	-	-	2	2
CYAN (6)	1	-	-	-	3	2
MAGENTA (10)	2	-	-	-	5	3
TOTALS (48)	9/48 (19%)	2/48 (4%)	-	-	25/48 (52%)	12/48 (25%)
Water-based Ink #W3 - Site 2						
BLUE (13)	2	-	-	-	8	3
GREEN (13)	3	-	-	-	7	3
WHITE (12)	3	-	-	-	7	2
CYAN (11)	-	-	-	-	8	3
MAGENTA (13)	2	-	-	-	8	3
TOTALS (62)	10/62 (16%)	-	-	-	38/62 (61%)	14/62 (23%)
Water-based Ink #W3 - Site 3						
BLUE (10)	1	-	-	-	7	2
GREEN (11)	2	-	-	-	6	3
WHITE (12)	2	-	-	-	7	3
CYAN (11)	-	-	-	-	8	3
MAGENTA (12)	1	-	-	-	8	3
TOTALS (56)	6/56 (11%)	-	-	-	36/56 (66%)	14/56 (25%)
Water-based Ink #W4 - Site 9A						
BLUE (14)	5	1	-	-	6	2
GREEN (15)	3	1	-	-	8	3
WHITE (10)	1	1	1	-	5	2
CYAN (17)	5	1	-	-	7	4
MAGENTA (10)	3	1	-	-	4	2
TOTALS (66)	17/66 (26%)	5/66 (8%)	1/66 (2%)	-	30/66 (45%)	13/66 (20%)

Ink system, color	Number of chemicals				SAT developmental concern ^c	No exposure	No data
	Risk-based evaluation ^b						
	low	possible	clear				
UV-cured Ink #U1 - Site 11							
BLUE (9)	-	-	-	1	7	1	
GREEN (10)	-	1	-	1	7	1	
WHITE (11)	-	-	-	1	9	1	
CYAN (9)	-	-	-	1	7	1	
MAGENTA (9)	-	-	-	1	7	1	
TOTALS (48)	-	1/48 (2%)	-	5/48 (10%)	37/48 (77%)	5/48 (10%)	
UV-cured Ink #U2 - Site 6							
BLUE (15)	-	1	-	-	12	2	
GREEN (15)	-	1	-	-	12	2	
WHITE (12)	-	-	1	-	9	2	
CYAN (14)	-	1	-	-	11	2	
MAGENTA (14)	-	1	-	-	11	2	
TOTALS (70)	-	4/70 (6%)	1/70 (1%)	-	55/70 (79%)	10/70 (14%)	
UV-cured Ink #U3 - Site 8							
BLUE (9)	-	-	-	2	6	1	
GREEN (9)	-	-	-	2	6	1	
WHITE (10)	-	-	-	1	8	1	
CYAN (9)	-	-	-	2	6	1	
MAGENTA (9)	-	-	-	2	6	1	
TOTALS (46)	-	-	-	9/46 (19%)	32/46 (70%)	5/46 (11%)	

^a The numbers in each column show the number of chemicals within each risk-based or SAT-based classification.

^b Criteria for level of concern are presented in Table 3.15 (page 3-48).

^c SAT concern levels are generated by the OPPT Structure Activity Team to predict toxicity based on analog data and/or structure-activity considerations. SAT concern levels are provided for chemicals with insufficient systemic hazard data available.

^d Number of chemicals in the color.

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Appendix 3-O (Risk Chapter)

Summary of General Population Systemic Toxicity Risk — Inhalation^a

Ink system, color	Number of chemicals						No exposure	No data
	Risk-based evaluation ^b			SAT-based evaluation ^c				
	low	possible	clear	low	low-moderate	moderate		
Solvent-based Ink #S1 - Site 9B								
BLUE (15) ^d	4	-	-	-	1	-	10	-
GREEN (12)	5	-	-	-	1	-	6	-
WHITE (13)	4	-	-	-	2	-	7	-
CYAN (9)	4	-	-	-	1	-	4	-
MAGENTA (14)	6	-	-	-	1	-	6	1
TOTALS (63)	23/63 (37%)	-	-	-	6/63 (10%)	-	33/63 (52%)	1/63 (2%)
Solvent-based Ink #S2 - Site 5								
BLUE (15)	4	-	-	-	2	-	9	-
GREEN (17)	4	-	-	-	2	-	11	-
WHITE (10)	2	1	-	-	2	-	5	-
CYAN (14)	3	1	-	-	2	-	8	-
MAGENTA (14)	3	1	-	-	2	-	8	-
TOTALS (70)	16/70 (23%)	3/70 (4%)	-	-	10/70 (14%)	-	41/70 (59%)	-
Solvent-based Ink #S2 - Site 7								
BLUE (15)	4	-	-	-	2	-	9	-
GREEN (17)	4	-	-	-	2	-	11	-
WHITE (11)	4	-	-	-	2	-	5	-
CYAN (14)	4	-	-	-	2	-	8	-
MAGENTA (14)	4	-	-	-	2	-	8	-
TOTALS (71)	20/71 (28%)	-	-	-	10/71 (14%)	-	41/71 (58%)	-
Solvent-based Ink #S2 - Site 10								
BLUE (15)	4	-	-	-	2	-	9	-
GREEN (17)	4	-	-	-	2	-	11	-
WHITE (11)	4	-	-	-	2	-	5	-
CYAN (16)	5	-	-	-	3	-	8	-
MAGENTA (16)	5	-	-	-	3	-	8	-
TOTALS (75)	22/75 (29%)	-	-	-	12/75 (16%)	-	41/75 (55%)	-

Ink system, color	Number of chemicals						No exposure	No data
	Risk-based evaluation ^b			SAT-based evaluation ^c				
	low	possible	clear	low	low-moderate	moderate		
Water-based Ink #W1 - Site 4								
BLUE (10)	5	-	-	-	-	-	5	-
GREEN (10)	5	-	-	-	-	-	5	-
WHITE (7)	2	-	-	-	-	-	5	-
CYAN (9)	3	-	-	-	-	-	6	-
MAGENTA (7)	2	-	-	-	-	-	5	-
TOTALS (43)	17/43 (40%)	-	-	-	-	-	26/43 (60%)	-
Water-based Ink #W2 - Site 1								
BLUE (16)	7	-	-	-	-	-	9	-
GREEN (9)	3	-	-	-	-	-	6	-
WHITE (7)	4	1	-	-	-	-	2	-
CYAN (6)	3	-	-	-	-	-	3	-
MAGENTA (10)	5	-	-	-	-	-	5	-
TOTALS (48)	22/48 (46%)	1/48 (2%)	-	-	-	-	25/48 (52%)	-
Water-based Ink #W3 - Site 2								
BLUE (13)	4	-	-	-	-	-	8	1
GREEN (13)	6	-	-	-	-	-	7	-
WHITE (12)	4	1	-	-	-	-	7	-
CYAN (11)	3	-	-	-	-	-	8	-
MAGENTA (13)	5	-	-	-	-	-	8	-
TOTALS (62)	22/62 (35%)	1/62 (2%)	-	-	-	-	38/62 (61%)	1/62 (2%)
Water-based Ink #W3 - Site 3								
BLUE (10)	3	-	-	-	-	-	7	-
GREEN (11)	4	-	-	-	-	-	7	-
WHITE (12)	3	1	-	-	-	-	8	-
CYAN (11)	3	-	-	-	-	-	8	-
MAGENTA (12)	4	-	-	-	-	-	8	-
TOTALS (56)	17/56 (30%)	1/56 (2%)	-	-	-	-	38/56 (68%)	-
Water-based Ink #W4 - Site 9A								
BLUE (14)	7	-	-	-	1	-	6	-
GREEN (15)	6	-	-	-	1	-	8	-
WHITE (10)	4	-	-	-	1	-	5	-
CYAN (17)	7	-	-	-	1	-	8	1
MAGENTA (10)	5	-	-	-	1	-	4	-
TOTALS (66)	29/66 (44%)	-	-	-	5/66 (8%)	-	31/66 (47%)	1/66 (2%)

Ink system, color	Number of chemicals						No exposure	No data
	Risk-based evaluation ^b			SAT-based evaluation ^c				
	low	possible	clear	low	low-moderate	moderate		
UV-cured Ink #U1 - Site 11								
BLUE (9)	-	-	-	-	1	1	7	-
GREEN (10)	-	-	-	-	1	2	7	-
WHITE (11)	-	-	-	-	1	1	9	-
CYAN (9)	-	-	-	-	1	1	7	-
MAGENTA (9)	-	-	-	-	1	1	7	-
TOTALS (48)	-	-	-	-	5/48 (10%)	6/48 (13%)	37/48 (77%)	-
UV-cured Ink #U2 - Site 6								
BLUE (15)	2	-	-	-	-	1	12	-
GREEN (15)	2	-	-	-	-	1	12	-
WHITE (12)	1	1	-	-	-	1	9	-
CYAN (14)	2	-	-	-	-	1	11	-
MAGENTA (14)	2	-	-	-	-	1	11	-
TOTALS (70)	9/70 (13%)	1/70 (1%)	-	-	-	5/70 (7%)	55/70 (70%)	-
UV-cured Ink #U3 - Site 8								
BLUE (9)	-	-	-	-	1	2	6	-
GREEN (9)	-	-	-	-	1	2	6	-
WHITE (10)	-	-	-	-	1	1	8	-
CYAN (9)	-	-	-	-	1	2	6	-
MAGENTA (9)	-	-	-	-	1	2	6	-
TOTALS (46)	-	-	-	-	5/46 (11%)	9/46 (20%)	32/46 (70%)	-

^a The numbers in each column show the number of chemicals within each risk-based or SAT-based classification.

^b Criteria for level of concern are presented in Table 3.15 (page 3-48).

^c SAT concern levels are generated by the OPPT Structure Activity Team to predict toxicity based on analog data and/or structure-activity considerations. SAT concern levels are provided for chemicals with insufficient systemic hazard data available. Criteria for SAT concern levels are presented on page 3-49.

^d Number of chemicals in the color.

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Appendix 3-P (Risk Chapter)

Summary of General Population

Developmental Toxicity Risk — Inhalation^a

Ink system, color	Number of chemicals				No exposure	No data
	Risk-based evaluation ^b			SAT developmental concern ^c		
	low	possible	clear			
Solvent-based Ink #S1 - Site 9B						
BLUE (15) ^d	3	-	-	-	10	2
GREEN (12)	5	-	-	-	6	1
WHITE (13)	3	-	-	-	7	3
CYAN (9)	4	-	-	-	4	1
MAGENTA (14)	5	-	-	-	6	3
TOTALS (63)	20/63 (32%)	-	-	-	33/63 (52%)	10/63 (16%)
Solvent-based Ink #S2 - Site 5						
BLUE (15)	3	-	-	-	9	3
GREEN (17)	3	-	-	-	11	3
WHITE (10)	2	-	-	-	5	3
CYAN (14)	3	-	-	-	8	3
MAGENTA (14)	3	-	-	-	8	3
TOTALS (70)	14/70 (20%)	-	-	-	41/70 (59%)	15/70 (21%)
Solvent-based Ink #S2 - Site 7						
BLUE (15)	3	-	-	-	9	3
GREEN (17)	3	-	-	-	11	3
WHITE (11)	3	-	-	-	5	3
CYAN (14)	3	-	-	-	8	3
MAGENTA (14)	3	-	-	-	8	3
TOTALS (71)	15/71 (21%)	-	-	-	41/71 (59%)	15/71 (21%)
Solvent-based Ink #S2 - Site 10						
BLUE (15)	3	-	-	-	9	3
GREEN (17)	3	-	-	-	11	3
WHITE (11)	3	-	-	-	5	3
CYAN (16)	4	-	-	1	8	3
MAGENTA (16)	4	-	-	1	8	3
TOTALS (75)	17/75 (23%)	-	-	2/75 (3%)	41/75 (55%)	15/75 (20%)

Ink system, color	Number of chemicals				No exposure	No data
	Risk-based evaluation ^b			SAT developmental concern ^c		
	low	possible	clear			
Water-based Ink #W1 - Site 4						
BLUE (10)	3	-	-	-	5	2
GREEN (10)	3	-	-	-	5	2
WHITE (7)	1	-	-	-	5	1
CYAN (9)	2	-	-	-	6	1
MAGENTA (7)	1	-	-	-	5	1
TOTALS (43)	10/43 (23%)	-	-	-	26/43 (60%)	7/43 (16%)
Water-based Ink #W2 - Site 1						
BLUE (16)	4	-	-	-	9	3
GREEN (9)	1	-	-	-	6	2
WHITE (7)	3	-	-	-	2	2
CYAN (6)	2	-	-	-	3	1
MAGENTA (10)	3	-	-	-	5	2
TOTALS (48)	13/48 (27%)	-	-	-	25/48 (52%)	10/48 (21%)
Water-based Ink #W3 - Site 2						
BLUE (13)	2	-	-	-	8	3
GREEN (13)	4	-	-	-	7	2
WHITE (12)	3	-	-	-	7	2
CYAN (11)	-	-	-	-	8	3
MAGENTA (13)	2	-	-	-	8	3
TOTALS (62)	11/62 (18%)	-	-	-	38/62 (61%)	13/62 (21%)
Water-based Ink #W3 - Site 3						
WHITE (12)	2	-	-	-	7	3
REFLEX BLUE (10)	1	-	-	-	7	2
345 GREEN (11)	2	-	-	-	7	2
PROCESS MAGENTA (12)	1	-	-	-	8	3
PROCESS CYAN (11)	-	-	-	-	8	3
TOTALS (56)	6/56 (11%)	-	-	-	37/56 (66%)	13/56 (23%)
Water-based Ink #W4 - Site 9A						
BLUE (14)	6	-	-	-	6	2
GREEN (15)	4	-	-	-	8	3
WHITE (10)	3	-	-	-	5	2
CYAN (17)	6	-	-	-	7	4
MAGENTA (10)	4	-	-	-	4	2
TOTALS (66)	23/66 (35%)	-	-	-	30/66 (45%)	13/66 (20%)

Ink system, color	Number of chemicals			SAT developmental concern ^c	No exposure	No data
	Risk-based evaluation ^b					
	low	possible	clear			
UV-cured Ink #U1 - Site 11						
BLUE (9)	-	-	-	1	7	1
GREEN (10)	1	-	-	1	7	1
WHITE (11)	-	-	-	1	9	1
CYAN (9)	-	-	-	1	7	1
MAGENTA (9)	-	-	-	1	7	1
TOTALS (48)	1/48 (2%)	-	-	5/48 (10%)	37/48 (77%)	5/48 (10%)
UV-cured Ink #U2 - Site 6						
BLUE (15)	1	-	-	-	12	2
GREEN (15)	1	-	-	-	12	2
WHITE (12)	1	-	-	-	9	2
CYAN (14)	1	-	-	-	11	2
MAGENTA (14)	1	-	-	-	11	2
TOTALS (70)	5/70 (7%)	-	-	-	55/70 (79%)	10/70 (14%)
UV-cured Ink #U3 - Site 8						
BLUE (9)	-	-	-	2	6	1
GREEN (9)	-	-	-	2	6	1
WHITE (10)	-	-	-	1	8	1
CYAN (9)	-	-	-	2	6	1
MAGENTA (9)	-	-	-	2	6	1
TOTALS (46)	-	-	-	9/46 (20%)	32/46 (70%)	5/46 (10%)

^a The numbers in each column show the number of chemicals within each risk-based or SAT-based classification.

^b Criteria for level of concern are presented in Table 3.15 (page 3-48).

^c SAT concern levels are generated by the OPPT Structure Activity Team to predict toxicity based on analog data and/or structure-activity considerations. SAT concern levels are provided for chemicals with insufficient systemic hazard data available.

^d Number of chemicals in the color.

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